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PERITONEOSCOPY

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PERITONEOSCOPY is the procedure of visualizing the peritoneal cavity and its contents by means of an optical instrument. The first demonstration and application of this procedure was successfully carried out over thirty-five years ago, and yet, strange to say, the method is but little used. In part, the reason for this reluctance to apply it is seen in the traditional wholesome conservatism with which every new scientific thought contends, and yet the endoscopic method of examining body cavities has hardly met with a clinical mishap which could serve as a hindrance to its acceptance.

Any procedure that allows one to see, through a mere puncture of the abdominal wall, clearly and sharply, the organs in the peritoneal cavity without a laparotomy and without discomfort to the patient, is ideal. It is especially ideal when a biopsy from tumors or tissues may be obtained, after recognition of the diseased condition. The procedure of peritoneoscopy offers such an alternative. This method, however, will not and cannot replace a laparotomy, but it is the procedure of choice in a great many abdominal conditions.

The internist must share the responsibility for fruitless laparotomies performed for diagnostic purposes, and he should use all the ancillary procedures at his disposal before he recommends a diagnostic laparotomy, in order to make or corroborate an intra-abdominal diagnosis. Unfortunately, many of the diagnostic methods that are in use today for making intra-abdominal diagnoses allow only vague and presumptive conclusions.

It is true that, by means of x-ray, a diagnosis may be made of intragastric lesions or lesions that affect the continuity and contour of the gastrointestinal tract. The roentgenologist can say whether a

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Presented with many lantern slides illustrating peritoneoscopic views of pathologic conditions before the Postgraduate Surgical Assembly, the tenth annual meeting of The Southeastern Surgical Congress, Atlanta, March 6, 7 and 8, 1939.

tumor is extragastric or intragastric, and in many cases, he can indicate the probability of malignancy of the lesion.

The gynecologist is able to palpate pathologic masses in the pelvis, and, by correlation with clinical history and symptoms, he makes a presumptive diagnosis of the lesion encountered.

In cases of ascites, the internist, by correlation of the findings and examination of the fluid, will make a presumptive diagnosis of cirrhosis, malignancy, tuberculosis, et cetera. Abnormal masses are often encountered in the abdominal cavity, and the question arises as to whether they are cysts, abnormal lobes of the liver, retroperitoneal tumors, or malignancies. A diagnostic laparotomy, often referred to as a mere trifle, may be from the patient's point of view, a very formidable affair. It usually involves a general anesthetic, some anesthetic vomiting followed, probably, by some flatulent discomfort, two or three weeks rest in bed, and occasionally complications with the wound. The expense may be considerable. In cases of carcinoma of the stomach or malignancy of the pancreas, death may follow so soon after as to raise a suspicion that the operation had something to do with the termination of the case.

Diagnostic laparotomy is often productive of harm in the accentuation of a neurosis, or by the exacerbation of symptoms, particularly in a case where the lesion remains undiscovered, or where an inoperable condition is discovered. A diagnostic laparotomy becomes fruitless in those cases in which intra-abdominal malignancy of an inoperable nature is suspected and a laparotomy is done in the hope that the presumption is not correct. Peritoneoscopy is a far less formidable alternative.

EXPLORATORY LAPAROTOMY	PERITONEOSCOPY
1. Economic features—large. a. Major operation. b. Hospitalization—2 weeks. c. Dressings—many.	1. Economic features—small. a. Minor operation. b. Hospitalization—1 day. c. Dressings—few.
2. General anesthetic.	2. Local anesthetic.
3. Diet limitations.	3. No diet restrictions.
4. Discomfort variable.	4. Practically no discomfort.
5. Large incision.	5. ¼ inch incision.
6. Mortality risk—6% (Lahey).	6. Mortality risk—0.11%.

The procedure of peritoneoscopy has been carried out, for diagnostic purposes, in over 900 cases (Table 1). The majority of the patients have been referred from the general diagnostic service of a large general hospital, and others from private physicians. These

patients have ranged in age from 6 months to 85 years, and have been both males and females. Many of the cases have been complicated with ascites so that a diagnosis has not been possible medically. Patients have been followed to the operating table whenever possible, and at post mortem—while many patients are still living.

TABLE I—ANALYSIS OF 900 CASES EXAMINED

Purpose of Examination	Cases
Differential diagnosis	539
Corroborating diagnosis	221
Determination of metastases	99
Differentiation and localization of tumors	41
Types of Cases	
Children and babies	14
Males	410
Females	490
Cases with ascites	415
Cases with jaundice	173
Biopsies of Organs and Tumors	198
Follow-Up	
Autopsies obtained	121
Subsequent operations	241
Laboratory check	50
Clinical follow-up	339
Patients still living	301

Analysis of 900 Cases Examined

This series of 900 cases includes all cases examined or attempted in succession, over a period of six years. Cases are not selected. A successful method of obtaining biopsies was not accomplished until after 300 of these cases had been examined. Biopsies are taken only in selected cases. Chronic pelvic inflammatory diseases, ectopic pregnancies or negative abdomens do not require biopsies. The determination that a tumor mass is an accessory lobe of the liver, a spleen, or a mass of rolled up omentum does not require a biopsy. Biopsies are taken when the abdominal condition encountered is not obvious.

Biopsy material has been obtained from growths in the peritoneal cavity when indicated for diagnosis. Biopsies have been taken repeatedly from the liver. All ascitic fluid obtained is given a careful examination. This is done by centrifuging, embedding the sediment in paraffin, sectioning and then examining and classifying the cells present. Many cases of malignancy have been proven by this method. In addition a bacteriologic examination is made in every case.

The following table (Table 2) shows the various pathologic conditions encountered in the 900 examinations which have been completed.

TABLE 2—PATHOLOGY NOTED IN 900 EXAMINATIONS

Abscess of liver	2
Adhesions, peritoneal	66
Appendix, chronic	4
Cancer of colon	7
Cancer of gallbladder	6
Cancer of liver, primary	3
Cancer of ovary, papillary cystadenoma	44
Cancer of rectum	2
Cancer of stomach	23
Cholecystitis, chronic	34
Cirrhosis of liver	257
Coccidioidal granuloma, peritoneal	1
Corpus hemorrhagicum	1
Diverticulum of bladder	1
Diverticulum of colon	2
Fibroid uterus	42
Gangrene of gallbladder	1
Hemangioma of liver	1
Hemoperitoneum	28
Hepar lobatum	9
Hepatic adenoma	3
Hepatitis	19
Hernia, inguinal	24
Hodgkin's disease	2
Hydrops of gallbladder	30
Hydrosalpinx	4
Hypogonadism	2
Leioma of stomach	2
Lipomatosis	4
Leukemia	1
Lues of stomach	1
Lymphoma of stomach	1
Malignant tumor, undescended testicle	3
Megacolon	1
Metastases to liver	129
Mucocele of appendix	1
Normal abdomen	42
Ovarian cyst	28
Pancreatic cyst	2
Passive congestion of liver	20
Pelvic inflammatory disease	42
Pelvic varicies	2
Perisplenitis	7
Peritoneal implants	94
Peritonitis, acute	2
Polycystic liver	2
Pregnancy, ectopic	29
Pregnancy, intrauterine	19
Retroperitoneal tumor	27
Spleen, enlarged	17
Tuberculous cecum	1

Tuberculous liver	1
Tuberculous peritonitis	31
Von Gierke's disease	2

History of the Subject

In 1901, Kelling first demonstrated this procedure on a living dog by inflating the abdominal cavity with air and examining the contents with a Nitze cystoscope. Kelling later published two monographs in the German literature, the first appearing in 1902 and the second, dealing with human subjects, in 1910. In 1910, Jacobaeus of Stockholm, published a paper on a like procedure of visceral exploration, developed independently by him.

In 1923, after thirteen years of silence, Kelling addressed the German surgical society concerning this subject. He related how the bad economic situation of the population after the War had compelled him to make wider use of this diagnostic method among his patients, since it saved them the prolonged and costly stay in the hospital which an exploratory laparotomy entails. The work of Kelling becomes remarkable in that the technic applied and described by him thirty-five years ago is, with little modification, the technic used today. He made use of pneumoperitoneum long before it was practiced in the field of roentgen diagnosis, but he failed to make early clinical application of his method and let Jacobaeus of Stockholm, almost ten years later, receive the recognition for the procedure. Kelling maintained that the mobility of the intestines in the living subject is such that they will not sustain injury, but will recede or slip aside before the gentle and slow thrust of the trocar. This same fact was brought out by Jacobaeus in his monographs on the procedure. Jacobaeus later devoted his major interests to the perfection of thoracoscopy and developed the technic of galvanocautery for separation of adhesion bands in the chest preliminary to collapse of the lung as used today throughout the world.

In 1911, Bernheim, an American, working at Johns Hopkins Medical School introduced a proctoscope of ½ inch bore through an incision in the epigastrium and with the aid of a head mirror examined the stomach, liver, gallbladder and diaphragm.

In 1912, Nordentoeft, of Copenhagen, devised an instrument which he termed a "trocarendoscope" and patented it under that name. He described the first views of the interior of the female pelvis as seen when the patient was in Trendelenburg's position, after the abdomen had been distended with air.

In 1912, Tedesko, of Vienna, reported his experiences with laparoscopy, following the technic described by Jacobaeus.

In 1912 and 1919, Stoklind, of Russia, reported the use of this procedure.

In 1913, Meirelles, in South America, published a discussion on laparoscopy

In 1913, and 1915, Renon and Rosenthal, of Paris, considered this method excellent for making visible to the observer certain affections of the liver and peritoneum.

In 1914 and 1920, Roccavilla, of Italy, modified the method by designing an instrument which permitted the source of light to remain outside the abdomen.

In 1920, Orndoff, of Chicago, stated that he experimented with this method many years and was still practicing it. He particularly praised it in diagnoses of hemoperitoneum, tuberculous peritonitis and extrauterine pregnancy.

In 1924, papers appeared from Edwards of London; Steiner of Atlanta, Georgia; Stone of Kansas; Zollikofer of Switzerland and Unverricht of Germany.

In 1925, Nadeau and Kampmeier of Chicago, published a very complete description of the technic of endoscopy of the abdomen.

In 1934, following an article by Ruddock of Los Angeles, in which he outlined in detail the technic of a safe procedure and described an instrument which he developed in order to accomplish properly, examinations by this method, the procedure of peritoneoscopy is being carried out in many centers in the United States and in various foreign countries.

The procedure has been given various names by the various workers who have pioneered in its development.

1. Coelioscopy (Kelling, 1901).
2. Ventroscopy (Van Ott, 1901).
3. Laparoscopy (Jacobaeus, 1911).
4. Organoscopy (Bernheim, 1911).
5. Peritoneoscopy (Orndoff, 1920; Ruddock, 1934).
6. Abdominoscopy (Medical Dictionary, Steiner, 1924).
7. Celoscopy (Medical Dictionary).
8. Splanchnoscopy (Medical Dictionary).

Instruments

The peritoneoscope developed for the examination of this series consists of five parts: (1) sheath, (2) bistoury tipped obturator which fits the sheath, (3) telescope made to fit the sheath, and a biopsy forceps, (4) fluid evacuator, (5) small needle trocar for pneumoperitoneum and a special Rehfuss tube with an electric light at the tip

The procedure of peritoneoscopy has been done in all cases in the operating room. Strict aseptic technic has been used throughout the procedure.

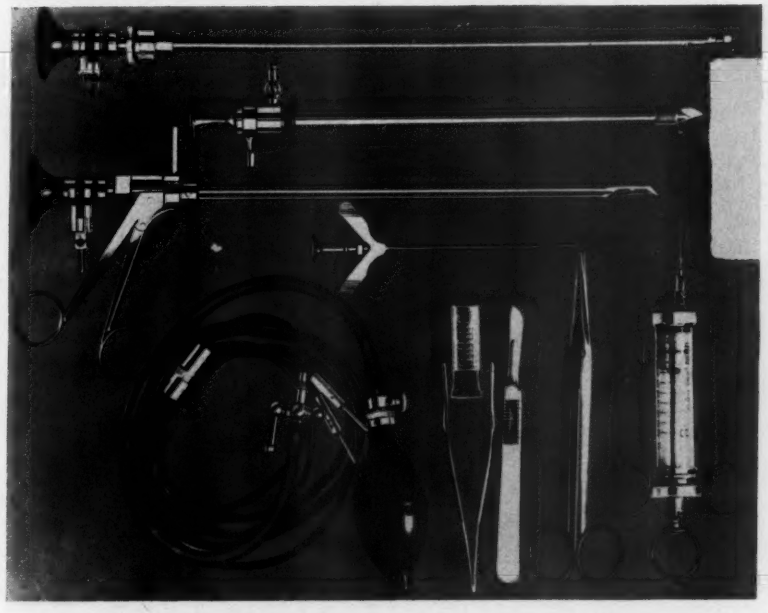

Fig. 1. Instruments necessary for the procedure arranged with accessories: telescope, sheath with bistoury-tipped obturator, biopsy forceps with telescope, pneumoperitoneum needle, sphygmomanometer bulb and tubing, electric cord connection, scalpel, scissors, thumb forceps, syringe, sponges and skin clamps.

The operating room technic is the same as for a laparotomy. The patient is draped and the abdomen prepared as for an abdominal incision. The peritoneoscopic instruments are sterilized by immersion in 1:1000 mercury cyanide solution for 30 minutes. This includes the electric cord for lighting purposes. Alcohol cannot be used as a sterilizing agent for the telescopes because it dissolves the cement around the lenses.

Equipment for an operating room set-up is as follows:

1. One cubic centimeter Luer syringe with needles for anesthetization.
2. Thirty cubic centimeters of 1 per cent novocain solution.
3. One scalpel.
4. One dozen small gauze sponges.
5. One baumanometer bulb and rubber tubing.
6. One battery for lighting instruments.

The operating room should be so arranged that it may be made dark during the examination.

Technic

No preparation is necessary before the examination, other than ¼ grain of morphine about 20 minutes before the puncture is to be made. The site of puncture is selected and local anesthesia with novocain is used. It is a good plan to encircle the puncture site with subcutaneous wheals of novocain with a diameter of approximately 10 cm. Following this, the needle is inserted to the peritoneum and novocain is infiltrated just above it. A small stab incision is made just large enough to admit the sheath of the instrument snugly, and the point of the knife is carried down until the fascial layers are nicked. The pneumoperitoneum needle is inserted into the abdominal cavity gently and moved around in a circle to determine the presence of adhesions or fixed bowel at the point of entry. The abdomen is then distended with air to such a degree that the abdominal wall is tense and does not give upon pressure. The pneumoperitoneum needle is then removed. The sheath with the bistoury tipped obturator, which acts as a trocar, is now inserted into the abdominal cavity.

The sheath is held firmly and inserted with a quick jab so that it enters the abdomen with a "pop". The necessity of a tensely distended abdominal cavity becomes evident when the insertion of the trocar is attempted. When ascitic fluid is present, the insertion is exactly the same as the insertion of a trocar preparatory to an abdominal paracentesis. It is necessary, in all cases, that the abdominal wall be tense and fixed, either by distention of the abdominal cavity with fluid or air, or both. The puncture must be carried out steadily and cautiously with the instrument pointing to either side of the spinal column, so that if the entrance into the cavity is made suddenly the gut will not be injured against the bony column.

As soon as the entrance has been accomplished the obturator is removed and the telescope is inserted. If fluid is present suction is applied with special evacuator inserted in the sheath and the abdomen emptied. This is done entirely with closed drainage. After evacuation of the cavity the air bulb is connected and the abdomen is distended with air. Ordinary atmospheric air is used. It is not necessary to measure the quantity of air used, as the abdominal cavity is not sensitive to inflation, and the patient complains of no sensation except that of fulness.

As soon as the abdomen is distended, the peritoneal cavity and its contents become visible, and the examination may proceed. Upon completion of the examination the air is allowed to escape. One may assist the evacuation of air by pressure with the hand placed flat on the belly. Having evacuated the air, the instrument is re-

moved. In cases of ascites the ascitic fluid may drain for a day or two. In cases without ascitic fluid one skin stitch or skin clamp is used and a simple dressing applied. No disability follows, and the patient is allowed to eat his meals without interruption.

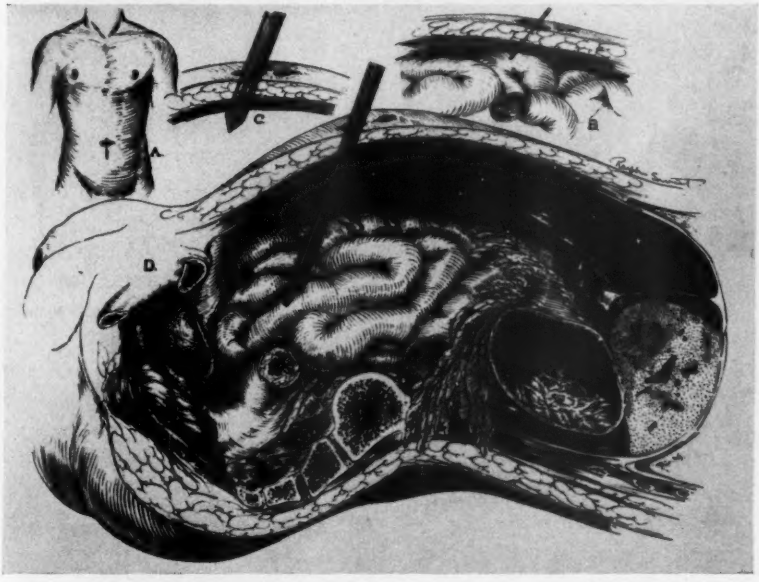

Fig. 2. Technic of Peritoneoscopy

A. Usual site of puncture.
B. Insertion of pneumoperitoneum needle.
C. Insertion of trocar.
D. Visualization of peritoneal contents with peritoneoscope.

Patients with ascites offer the best type of case for this procedure because the abdominal wall, which has been stretched by the fluid, allows the easy replacement of the fluid with air. Little discomfort is noted following the introduction of air into the peritoneal cavity, even in those cases in which there has been no previous distention. Ordinary atmospheric air is used instead of oxygen, nitrogen, or carbon dioxide. The amount of air introduced is not important as long as the patient is flat or in the Trendelenburg position. In the series reported, there have been no complaints of the usual shoulder pains often described following a tubal insufflation. The air is always removed following the procedure, although some residual air, localized between the liver and diaphragm, often remains. This has been noted occasionally in cases examined with x-ray shortly following the procedure.

The Value of this Method

The value of peritoneoscopy lies in its ease of application and the differential diagnostic possibilities obtained through this direct, eye controlled method of examination. It is possible to diagnose a questionable case correctly and without delay. It is possible to decide early the advisability of operation in patients showing grave disease. It is possible to differentiate neoplastic masses from various organs in the peritoneal cavity. It is a simple method for determining the operability of malignant gastric lesions.

The method may be used in cases of elderly, markedly emaciated and anemic patients, and in those cases where the surgical risk is considered very poor.

Because of its ease of application, it is the method of choice for the differential diagnosis of cases of ascites of undetermined origin, for the determination of the sources of tumors, for deciding the operability of some intra-abdominal lesions, and for the determination of intra-abdominal metastases.

The indication for its use in gynecologic cases needs no comment when the profession realizes the extent to which this ideal method of examination of the pelvic organs can be carried out. We are able to see the organs clearly in their natural living colors.

Peritoneoscopy does not, and will not, replace laparotomy; but it is the procedure to be selected when confronted with the above diagnostic problems.

In several instances in this series the clinical diagnosis appeared self-evident, but was altered by peritoneoscopic examination. This has been true principally in cases in which the diagnosis has been changed from cirrhosis to malignancy or from malignancy to cirrhosis.

All patients with clinical cirrhosis of the liver, or suspected cirrhosis, should have the benefit of a peritoneoscopy in order to classify the condition definitely.

Visual Examination

A safe and easily changeable table is needed for the examination. Movement of the instruments cause the patient no discomfort unless pressure is made against the parietal peritoneum, or a loop of bowel is pulled by the tip. The light of the instrument shines through the abdominal wall revealing shadows of dilated blood vessels.

Peritoneoscopy visualizes the surface of organs which are contained in the peritoneal cavity, but nothing inside of a viscus or buried deep in the tissues can be seen.

The liver, after air insufflation, falls away from the diaphragm and can be examined in regard to its color, smoothness, nodules and size. The edges can be followed, the upper surface right and left lobes, and a portion of the under surface seen. The gallbladder can be noted beneath the edge, and its thickness, size, color, circulation, and adhesions are easily seen. Gall stones cannot be seen. Steiner reports that he was able to palpate stones with the tip of the instrument. This has been possible on rare occasions. Occasionally, shadows, suggestive of stones, can be transilluminated through a distended gallbladder.

The greater curvature of the stomach can be noted, and the anterior surface examined. The lower tip and edge of the spleen is seen in the extreme upper left quadrant just beyond the stomach surface. When enlarged, the spleen is easily examined. The omentum can be examined completely. The surface of small coiled intestines gives a remarkable picture. Normally, they appear with a slightly brown hue, and peristaltic waves can be noted. The surface of the cecum, the ascending, transverse and descending colons are easily visualized. The appendix is seen only occasionally.

The dome and posterior surface of the bladder, the fundus of the uterus, tubes and ovaries are seen and pathologic state noted. The parietal pelvic peritoneum can be examined completely throughout.

Occasionally, the omentum lies over the surface of the liver or covers organs so that they cannot be examined. If such is the case, the tip of the instrument can be used to lift or tease the omentum from the organs and shift it to another part of the abdominal cavity. This procedure brings the organs into view, such as the gallbladder or the surface of the liver, which would not be visible otherwise.

Technic of Obtaining Biopsy Specimens

Biopsy specimens may be obtained through the peritoneoscope sheath. Biopsy specimens should not be taken directly from the tissues of a hollow viscus, abscesses, or cysts because of the possibility of injury or perforation. Liver and spleen biopsy specimens or suitable pieces of tissue from any solid organ or tumor mass can be obtained for examination. Biopsy specimens are easily obtained from metastases in the liver and omentum, or from the peritoneal surfaces.

The tip of the biopsy forceps when closed is so arranged that it forms a cup containing the tissue material. The closed tip acts as an electrode for coagulating the wound resulting from cutting the biopsy specimen. The biopsy material is not affected by the coagulation current. All wounds should be thoroughly coagulated after the

specimen is obtained, regardless of whether bleeding is noted or not. This is especially true when the specimens are taken from the liver or spleen.

The abdomen should be completely distended with air and the point selected for taking the material should be isolated from adjacent tissues, so that there is no possibility of coagulating tissue other than at the point from which the specimen is taken. Practically any type of high frequency generator, diathermy machine, coagulating unit or whatever else it may be called, can be used with the biopsy forceps for hemostasis or coagulation. The current may be properly adjusted before use, by trying it on a piece of meat.

A small visualizing telescope is used with the biopsy forceps so that the entire procedure of cutting the specimen and hemostasis is constantly under vision.

Recognition of Pathologic Conditions

The macroscopic appearance of living tissue is quite distinctive and differs considerably from the appearance in the cadaver. Peristalsis is noted in intestines and stomach, and pulsation is seen in liver and spleen.

When an examination is made of the contents of the abdominal cavity all the facts noted are correlated into a final conclusion. A large smooth, red liver would suggest chronic passive congestion or hepatitis; whereas a small liver with a wrinkled surface and hobnailed irregularities would suggest atrophic cirrhosis.

Adhesions are noted as to whether they are situated at site of former operations, or are general. They may be spider web, lacelike, or massive bands. Carcinomatosis of the peritoneal cavity is seldom, if ever, associated with adhesions.

Absence of peristalsis in a localized area of the stomach suggests an intrinsic lesion in this portion. When the spleen is visible it is enlarged. Dilated veins in the mesentery, stomach and under surface of the diaphragm are seen in cases of cirrhosis. Malignant metastases usually are distinctive in that they are various sized nodules, but often miliary implantations are impossible to differentiate from miliary tuberculosis without a biopsy. A deeply jaundiced patient with a thickened, small whitish gallbladder would suggest chronic cholecystitis with stones, whereas a distended normal appearing gallbladder would suggest carcinoma of the head of the pancreas.

Operability of Gastric Cancer

Early diagnosis is essential if there is any hope of reducing the mortality of stomach cancer from its present high rate. By the

time the patient presents a classic picture of cancer of stomach, weight loss, emaciation and vomiting, not much hope is left; though the lesion be technically removable, operative mortality then looms too high. In Lahey, Swinton and Peelen's series, the x-ray pictures proved diagnostically accurate in 95 per cent of the cases. However, these men concluded that the decision as to the operability of a given stomach cancer is difficult and easily mistaken. They concluded that palliative operations were distinctly unfortunate in these cases, but that exploration to settle the question of operability was frequently indicated and that the mortality rate in those exploratory laparoomies was low. In the Lahey, Swinton and Peelen series only 25 per cent of the cases were operable. In their series, explorations were done in 17.4 per cent of inoperable cases with a 6 per cent mortality from the exploration.

In cases of given stomach cancer, three things are necessary to make the decision of operability, provided that no metastases are demonstrable in the skin, glands, lungs, or bones. These are:

1. Are there metastases in the liver?
2. Is there extension to adjacent tissue and peritoneum?
3. How much of the stomach is not involved?

These questions can be answered in a very high percentage of cases by means of peritoneoscopy. Visible metastases can be seen and easily identified in the liver. The peritoneal surfaces and omentum can be examined for visible metastatic lesions. The cancer in the stomach can be seen and adjacent tissues examined for extension of the lesion. By means of air and transillumination, the amount of uninvolved stomach wall can be approximately estimated.

Peritoneoscopy should always be done in lieu of exploration in order to determine the question of operability of a stomach cancer. In the Lahey, Swinton and Peelen series in which 17.4 per cent had explorations and were found to be inoperable, the majority of these cases could have been determined by means of the simple procedure of peritoneoscopy. The operative mortality of 6 per cent could have been markedly lessened.

The technic for the examination of a known case of gastric cancer is not difficult. The patient is prepared as described for peritoneoscopy. The stomach is clean and empty. The special stomach tube, fitted with an electric light at its tip, is placed in the stomach through the mouth prior to examination. The peritoneoscope is inserted as previously described. The liver is visualized for metastatic lesions; the stomach is examined in its normal state, noting circulation, color, and lesion visible. The stomach is now distended with air, under vision, and examined while it unfolds. Good stomach

wall distends, infiltrated stomach wall is rigid. When the stomach has been distended with air, the globe at the tip of the tube is lighted and the stomach wall is transilluminated. The stomach appears to the observer like a "Chinese lantern" and any infiltrations in the gastric mucosa can be outlined. It has been my custom to have the surgeon present at this examination in order to determine, with the peritoneoscopist, the operability of a case. In a small percentage of cases of this kind, no metastases are found except in retroperitoneal nodes. If such is the case, an exploratory laparotomy must be done, as peritoneoscopy will not visualize these retroperitoneal glands.

Pelvic Examinations

The gynecologist becomes very adept in determining lesions in the female pelvis bimanually. However, he is often at a loss to determine the source and type of unusual masses, the presence or absence of ectopic pregnancies, the congenital absence of organs and to differentiate, at times, chronic pelvic inflammatory lesions from other diseased conditions.

When a patient is placed in the Trendelenburg position and pneumoperitoneum is produced the viscera in the pelvis are displaced and the entire pelvis is exposed to view. The uterus, both tubes, both ovaries, the sigmoid colon and bladder can be visualized. The examination is facilitated and assisted by inserting one hand in the vagina and manipulating the pelvic organs. The uterus may be moved from side to side, thus exposing the tubes, ovaries and round ligaments. Occasionally, one may push up into view abnormal masses buried deeply in the broad ligaments.

Ectopic pregnancies, engorged, reddened tortuous tubes, hydrops of the tubes, absence of organs, malformation of organs, adhesions, pelvic tuberculosis, malignant metastases, malignant tumors of the ovaries, cysts and fibroids can all be seen and recognized.

Other Examinations

The sigmoid colon can be examined with the peritoneoscope in the same manner as a stomach examination is conducted. A tube may be inserted into the rectum, on the tip of which is an electric light, or a proctoscope may be used.

This procedure is also applicable to examining the colon for spasm and spasticity.

Diverticula may be noted. In one case a diverticulum of the bladder was seen.

Hernias may be visualized from inside the abdominal cavity, and the tip of the telescope may even be placed in the hernial ring.

Abdominal examinations may be markedly assisted by manipulation of masses and viscera with one hand of the operator on the abdominal wall.

Complications and Accidents

Puncture of a viscus is a complication that may happen to anyone attempting peritoneoscopy. This can be avoided, however, by: (1) careful examination of the patient prior to attempting procedure; (2) selecting the point of puncture to avoid all operative abdominal scars; (3) always using a bistoury plunger with a dull tip.

Kelling maintained in his early writings that the mobility of the intestines in the living subject is such that they will not sustain injury but will recede or slip aside before the gentle and slow thrust of the trocar. This same fact has been brought out by Jacobaeus, Ruddock and other writers on this subject. Any viscus, unless so adherent that all freedom of movement is gone, will slip aside before the thrust of the trocar in the living subject. The intestines may be punctured by this method, should it be firmly fixed to the parietal peritoneum by adhesions. Puncture of the bowel has occurred in this series of 900 cases 8 times (Table 3). Each time the instrument has been left in place and an abdominal incision has been made. In each instance the trocar could have been removed without soiling the peritoneal cavity, as the bowel was firmly plastered against the parietal peritoneum.

The death recorded, resulting from a fatal hemorrhage following a biopsy from a metastatic carcinoma nodule in the liver, occurred because of insufficient coagulation of the biopsy wound. Many biopsies have been taken since, but thorough coagulation of the wound is done in all cases whether bleeding is noted or not.

Due to extensive peritoneal malignancies and extensive adhesions from tuberculosis, cases will be encountered in which it is impossible to enter the abdominal cavity with a peritoneoscope. This has occurred three times in this series, once with malignancy and twice with tuberculosis. The peritoneoscope merely enters a small pocket walled off by adhesions, or it is impossible to produce pneumoperitoneum in order to go ahead with the procedure. When such an abdomen is encountered, no attempt is made to insert the peritoneoscope. However, the finding of such a condition may accomplish the purpose for which the examination was intended.

Hernia through the scar of the punctured wound has not occurred in this series of cases.

Selection of Cases

Keeping in mind that nothing inside of a viscus, or buried deep in the peritoneal cavity, can be visualized, cases suspected of disease

TABLE 3—ACCIDENTS AND COMPLICATIONS

Accidents	Cases	Per Cent
1. Small bowel punctured with hypodermic needle, no sequelae	1	
2. Small bowel punctured with pneumoperitoneum nedle. Operation—hole repaired; uneventful recovery. Cause — postoperative adhesions	1	
3. Small bowel punctured with trocar. Operation—hole repaired. Uneventful recovery. Cause—postoperative adhesions	1	
4. Small bowel punctured with trocar. Operation—hole repaired. Uneventful recovery. Cause—tuberculous peritonitis	1	
5. Transverse colon punctured with trocar. Operation—hole repaired. Uneventful recovery. Cause—carcinomatosis	1	
6. Sigmoid colon punctured with trocar. Operation—hole repaired. Uneventful recovery. Cause—intestinal obstruction—(carcinoma of rectum)	1	
7. Stomach punctured with pneumoperitoneum needle. Operation—hole repaired. Uneventful recovery. Cause—full meal	1	
8. Stomach punctured with trocar. Operation—hole repaired. Uneventful recovery. Cause—dilated stomach—(Hodgkin's disease)	1	
Total Accidents	8	0.88
Deaths	1	0.11
Examination determined extensive metastatic carcinoma of liver. Biopsy specimen taken from nodule. Patient died 6 hours later of hemorrhage from biopsy wound in liver.		

SUMMARY

Total Cases Examined	900	
Total Complications and Deaths	9	1
Unsuccessful Examinations	3	0.33
Cause of failure to enter abdominal cavity in all 3 cases due to dense adhesions.		

of this character should not be selected for peritoneoscopy. Occasionally, negative examinations are valuable to the clinician. When this is the case, the procedure is justified. The duodenum cannot be seen. Cases of duodenal ulcer or gastric ulcer should not be subjected to peritoneoscopy because there is an absolute means of diagnosis, namely, the roentgen ray. Acute abdominal cases should not be considered or selected. In cases of obstructive lesions of the

large bowel, megacolon, markedly dilated stomach, intestinal obstruction and a paralytic ileus, peritoneoscopy is contraindicated. Danger of perforation in this type of case is very great, and nothing can be accomplished by the procedure. In carcinoma of the head of the pancreas, the examination may be negative except for deeply jaundiced tissue, biliary cirrhosis and a markedly distended gallbladder.

Kidney lesions can not be seen, although tumors of the kidney may appear as retroperitoneal masses in the abdominal cavity.

Chronic cases should be selected and hasty surgery should be censured when there is plenty of time to make a diagnosis on these abdominal conditions. Emaciation, age, anemia, mental disorientation, albuminuria, diabetes and deep jaundice are not contraindications to peritoneoscopy. The procedure has been carried successfully in each of these types of cases.

Care should be used in all cases regarding the amount of preoperative medication. Elderly, emaciated individuals should not be given large doses of narcotics. It is preferable in anemic, dehydrated and aged patients to give no preliminary operative medication.

Accomplishment of Purpose of Examination

The procedure of peritoneoscopy should not be done without a definite purpose for which the examination is made. The procedure is then carried out in order to accomplish this purpose. To determine the presence of metastases, to corroborate a diagnosis, to differentiate and localize tumor masses, and to aid in differential diagnoses are purposes of examination which justify the procedure.

If the purpose of examination is accomplished, then the examination is successful and justified. The procedure should not be expected to do more than accomplish the purpose for which it is done.

Examination of Infants and Children

This procedure can be applied to the examination of the peritoneal cavity of infants and children. The same instruments are used, and the same procedure and technic is followed with the following exceptions:

1. Generalized anesthesia is necessary.
2. The site of the puncture is always made through the belly of the rectus muscle in order to offset the possibility of producing a hernia.

The abdominal organs are easily visualized because of the practical absence of omentum which, in the adult, sometimes interferes with visualization of organs. Transillumination of the infant ab-

domen is particularly striking. This procedure is of great value in determining liver disease in infants and children.

Operative Procedures

With the advent of the high frequency current, it is possible to cut and coagulate tissue. Adhesive bands have been successfully severed in the abdominal cavity by means of an electrical knife and coagulation. The same principle is used in the abdominal cavity as is used in pneumolysis. Sensation is absent unless the parietal peritoneum is actually touched.

Collapse of the right lung may be assisted by severing the adhesions between the right diaphragm and the dome of the liver and raising the diaphragm by means of pneumo-peritoneum.

Drainage of liver abscesses can be accomplished by means of a needle or small trocar inserted directly into the abscess under vision. Large ovarian cysts may be decompressed in this same manner.

TABLE 4.

TUBERCULOUS PERITONITIS—TOTAL OF 51 CASES

Unsuspected clinically	7
Suspected clinically	44
Actual cases proven	30
Clinically correct	27
Clinical accuracy	53%
Peritoneoscopic diagnosis correct	44
Peritoneoscopic accuracy	86%

Clinical Errors—Correctly Diagnosed by Peritoneoscopy

Cirrhosis of the liver	8
Malignancy	5
Pelvic inflammatory disease	1
Normal	7
Passive congestion	1
Postoperative adhesions	1
Amebic abscess	1
Total clinical errors	24
Total percent clinical errors	47%

Peritoneoscopic Errors

Malignancy	2
Amebic abscess of liver	1
Cirrhosis of liver	2
Unsuccessful	1
Accident	1
Total peritoneoscopic errors	7
Total percent peritoneoscopic errors	14%
Both in error	4
Both correct	24

TABLE 5. PERITONEAL METASTASES—TOTAL OF 129 CASES

Suspected clinically	119
Clinically correct	95
Actual cases proven	99
Clinical accuracy	73.7%
Peritoneoscopic diagnosis correct	121
Peritoneoscopic accuracy	93.8%

CLINICAL ERRORS—CORRECTLY DIAGNOSED BY PERITONEOSCOPY

Tuberculous peritonitis	6	
Cirrhosis of the liver	14	
Postoperative adhesions	5	
Intestinal obstruction	1	
No metastases	3	
Ovarian cyst	1	
Undetermined	1	
Passive congestion	1	
Hypernephroma	1	
Hodgkin's disease	1	
Total clinical errors		34
Total percent clinical errors		26.3%

PERITONEOSCOPIC ERRORS

No metastases	3	
Syphilis	1	
Tuberculous peritonitis	1	
Unsuccessful	2	
Accident	1	
Total peritoneoscopic errors		8
Total percent peritoneoscopic errors		6.2%
Both correct		87
Both in error		1

LIVER LESIONS

The macroscopic appearance of the liver in disease may be very distinctive and pathognomonic of the disease. These correlated pictures soon become quite characteristic to the observer and he is able to tell, at a glance, the underlying pathologic condition. This may be corroborated by a biopsy. The liver may be enlarged, nodular, smooth, infiltrated with nodules, red, brown, green or slate color; hard or soft; painful or painless; lobulated, thickened capsule, rounded edged, dislocated or covered with adhesions.

When the macroscopic appearance of the liver is associated with the clinical picture as we see it, and a microscopic slide of the liver substance is done, the diagnosis of liver disease should be relatively accurate.

TABLE 6. CIRRHOSIS—TOTAL 318 CASES

Unsuspected clinically	47
Suspected clinically	271
Actual cases proven	274
Clinically correct	234
Clinical accuracy	73.5%
Peritoneoscopic diagnosis correct	304
Peritoneoscopic accuracy	95.5%

CLINICAL ERRORS—CORRECTLY DIAGNOSED BY PERITONEOSCOPY

Malignancy	50
Normal	15
Tuberculous peritonitis	4
Passive congestion	6
Postoperative adhesions	2
Hepatitis	2
Hemangioma	1
Coccidioidal granuloma	1
Hodgkin's disease	1
Cyst of pancreas	1
Gumma of liver	1
Total clinical errors	84
Total percent clinical errors	26.5%

PERITONEOSCOPIC ERRORS

Malignancy	6
Normal	1
Hepatitis	2
Postoperative adhesions	1
Accident	1
Unsuccessful	2
Tuberculous peritonitis	1
Total peritoneoscopic errors	14
Total percent peritoneoscopic errors	4.4%
Both in error	3
Both correct	223

RELATION TO ENDOCRINOLOGY

Many questions often arise with relation to function of the ovaries. It is often necessary to know the exact condition of the ovaries in order to outline the proper course of treatment. Menstrual dysfunction, with associated endocrine manifestations, may be due to infantile pelvic organs, and even to absence of organs.

Sterility may be definitely established by examining the ovaries during the ovulation period, or by the discovery of endometritis.

TABLE 7

MALIGNANCY OF THE LIVER—TOTAL 224 CASES

Unsuspected clinically	13
Suspected clinically	211
Actual cases proven	130
Clinically correct	125
Clinical accuracy	55.8%
Peritoneoscopic diagnosis correct	210
Peritoneoscopic accuracy	93.7%

CLINICAL ERRORS—CORRECTLY DIAGNOSED BY PERITONEOSCOPY

Cirrhosis	65
Hepatitis	4
Passive congestion	3
Normal	13
Chronic cholecystitis	3
Postoperative adhesions	3
Polycystic liver	1
Ovarian cyst	2
Carcinoma of the ovary	1
Hepar lobatum	1
Hodgkin's disease	2
Tuberculosis of liver	1
Total clinical errors	99
Total percent clinical errors	44.1%

PERITONEOSCOPIC ERRORS

Cirrhosis	8
Normal	1
Abscess	2
Passive congestion	1
Cholecystitis	1
Hepar lobatum	1
Total peritoneoscopic errors	14
Total percent peritoneoscopic errors	6.3%
Both in error	5
Both correct	116

In cases of hirsutism in young females, one is justified in examining the ovaries and taking a biopsy from them in order to discover, if possible, the presence of an arrhenoblastoma.

The sex of a hermaphrodite may be determined definitely and accurately by a peritoneoscopic examination.

PERITONEOSCOPIC STATISTICAL STUDY OF DIAGNOSTIC ACCURACY

The compilation of statistics with regard to comparing clinical methods of diagnosis and peritoneoscopic methods, accurately, becomes exceedingly difficult. This is especially true when a case is

TABLE 8

ECTOPIC PREGNANCIES—TOTAL OF 58 CASES

Unsuspected clinically	1
Suspected clinically	57
Actual cases proven	27
Clinically correct	29
Clinical accuracy	50%
Peritoneoscopic diagnosis correct	58
Peritoneoscopic accuracy	100%

CLINICAL ERRORS—CORRECTLY DIAGNOSED BY PERIONEOSCOPY

Intrauterine pregnancies	12	
Intrauterine pregnancies with P.I.D.	5	
Pelvic inflammatory disease	7	
Ruptured ovarian cyst	2	
Ovarian cyst	2	
No disease	1	
Total clinical errors		29
Total percent clinical errors		50%
Both correct		29

referred for peritoneoscopy with four or five suspected clinical diagnoses. One may be correct, the others may be wrong, or all may be wrong and the peritoneoscopic diagnosis may be right or wrong. The accompanying tables reveal the percentage of clinical accuracy compared to the percentage of peritoneoscopic accuracy and list the errors in diagnosis for both methods. Selected for statistical study, are suspected cases of tuberculous peritonitis, (Table 4); peritoneal metastases (Table 5); cirrhosis (Table 6); malignancies of the liver, both primary and secondary (Table 7); and ectopic pregnancies (Table 8). This makes a total of 780 cases.

This is the number of cases conforming to the above diagnoses which have occurred in the series of 900 cases reported. The remaining 120 cases are made up of various diagnoses, a series of each of which is too small for making a statistical study.

The average clinical accuracy in the total series is 61.4 per cent, whereas the average peritoneoscopic accuracy is 93.64 per cent. The comparison for the individual case diagnosis is shown in the accompanying tables.

SUMMARY

Peritoneoscopy should be selected in lieu of a diagnostic laparotomy where it is necessary to determine malignancies, metastases and extent of involvement, to differentiate tumor masses, and localize them, to examine the surfaces of viscera and pelvic organs, or to corroborate a diagnosis or to obtain biopsies. It should not be se-

lected for use in cases with acute inflammatory lesions in the peritoneal cavity.

Peritoneoscopy is a minor procedure under local anesthesia, with practically no discomfort and small economic features, in contrast to a diagnostic laparotomy which is a major procedure requiring a general anesthetic and entailing considerable economic features and variable discomfort.

The procedure cannot take the place of surgery, but, by making a definite and correct diagnosis, it may prove a valuable aid if the case is an operable one and surgery is deemed necessary.

The value of this procedure becomes evident when we note that examinations can be made completely and accurately; biopsy specimens of tumor masses and tissues may be quickly, safely and painlessly taken for diagnostic purposes, and exploration of poor surgical risks may be accomplished.

All patients with a diagnosis of cirrhosis, or suspected cirrhosis, of the liver should be examined with the peritoneoscope for corroboration. A questionable diagnosis can often be excluded or confirmed, and a decision reached as to form, kind, and extent of the pathologic process.

A definite purpose of examination is necessary to justify a peritoneoscopic examination. The procedure should not be expected to accomplish more than the purpose for which it is done.

The very practical results of this relatively simple method of examining the contents of the abdominal cavity with the eye should command for it as a diagnostic procedure the general use which the cystoscope now holds for the examination of the bladder and kidneys.

The peritoneoscopic accuracy, as noted in a statistical study of 780 case studies, is 93.64 per cent as compared to the clinical accuracy of 61.4 per cent.

The procedure of peritoneoscopy is a technical one and requires that the operator train himself in the details of the procedure and in the use of the instruments. He should be able to recognize and differentiate the macroscopic appearance of pathologic processes when seen.

ADJUSTABLE LISTON SPLINT WITH FOOT PIECE ATTACHED FOR THE HANDLING OF FRACTURES

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Hamilton, Ohio

THE Liston splint with foot piece attached that is now in use for the handling of fractures of the femur and injuries to the hip, comes in various lengths and a number of them have to be carried in the fracture equipment. The Liston splint is used only as an emergency splint for transporting cases to the hospital.

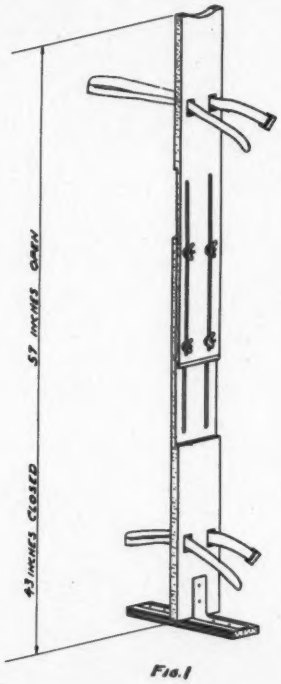


FIG. 1

The adjustable Liston splint, to be herein described, is applicable not only to fractures of the femur and to injuries of the hip, but also to fractures of the lower leg and of the upper extremity. It is so constructed that it can be applied to an individual of any height. It does away with carrying an assortment of sizes and keeps the fracture equipment at a minimum. It can be used right or left.

Description of the splint is as follows:

Figure 1. The vertical portion of the splint is divided into two equal sections or halves. The length of each section or half is 31

inches. The upper end of the lower section and the lower end of the upper section is now sawed halfway through, 20 inches from their respective ends on the flat surface. From these ends they are sawed downward to where they have been sawed halfway through. This will allow a block to be taken out of each section. Where each section of the splint has been sawed halfway through and the block removed on the flat surface, two slots are cut out 16 inches in length and 5/8 of an inch in width, the slots being parallel to each other. When the two sections of the splint are placed together they come up flush; that is, they fit into each other, also the slots will correspond. At the distal end of each section where the slots have been cut out a small metal band goes around them to strengthen them.

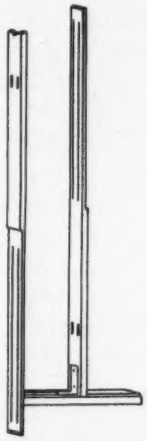


FIG. 2

Four bolts, 1 1/2 inch in length with a stem 1/4 of an inch in diameter and having a rounded flat head, the head being 1 inch in diameter, are placed into the slots, two bolts in each slot. They are so placed that they will be in the extreme ends of the slots. A wing nut head, 1 inch in diameter, is now placed on each bolt and screwed down. This will make the two sections of the splint firm, as if in one piece. The wing nut head can be loosened, which allows the two sections to be drawn apart. In this way the splint can be made longer or shorter, and when the desired length has been obtained the wing nut heads can be screwed down tight. Always keep the bolts in the extreme ends of the slots.

When the splint is in its shortest position it is 43 inches in length from the foot piece to the lowest point in the concavity of the upper section which fits into the arm pit. The splint can be lengthened to

57 inches. This allows the splint to be made 14 inches longer from its closed position. In each section a slot is made for a strap to pass through with a buckle attached.

The width of the vertical section is 5½ inches and ½ inch in thickness. The foot piece is 9 inches long, 3½ inches wide and ½ inch in thickness. The splint is made of ash or hickory. Made of this wood it allows for flexibility.

The splint can be applied to anyone ranging from 56 inches in height to 78 inches. In the event anyone is under 56 inches in height the lower section of the splint can be used which has the foot piece attached by taking the splint apart. The upper section can be used for fractures of the upper extremity. Figure 2 shows the splint in a position to be used for fractures of the lower leg.

The adjustable Liston splint is applied like the standard Liston splint. The straps that are attached to the splint help hold the splint firmer when applied. It is to be understood that additional bandages or straps have to be used in addition to the ones on the splint.

The adjustable Liston splint is not intended to take the place of the Thomas splint for fractures of the femur where traction is needed when being transported for long distances by train or ambulance.

The adjustable splint is easily carried in ambulances, police patrols, first aid stations along the highways and office equipment.

207 Ross Avenue

FRACTURES OF THE NECK OF THE FEMUR

Treatment by Internal Fixation with Adjustable Nails

AUSTIN T. MOORE, M. D.
Columbia, S. C.

WITHIN the past few years, a great deal of progress has been made in the treatment of fractures of the neck of the femur and internal fixation of the fragments has been proved the method of choice. No longer should this injury be spoken of as the unsolved fracture problem. Due credit should be given to Smith-Petersen of Boston for devising the three-flanged nail and to Johannsen of Sweden for introducing the lateral incision through which the nail may be inserted easily. Many modifications of the nail and of the technic of operation have since been advocated and various independent workers have contributed to the improvement in technical methods. I will demonstrate to you in a movie the technic of a method I began to use four years ago, and try to explain the most important points as the movie is shown.

Advantages of this method are that almost every case of fracture about the hip joint (intracapsular or intertrochanteric) can be treated in this way. Improvement in the general condition of the patient usually follows immediately. The postoperative convalescence is usually smooth and comfortable. The patient may be up and about in a wheelchair or on crutches in a few days. Expense of hospitalization and of nursing care is greatly diminished. Morbidity is lessened, the mortality rate is lowered, and there should result no deformity or disability.

To secure union I believe the fragments should be perfectly reduced and they should be held rigidly immobilized over a long period of time. In my opinion multiple nailing with adjustable nails affords better mechanical fixation than any other type of single nail, screw, or flanged nail. When nails are properly inserted and widely separated from each other, the fragments are perfectly immobilized. The fragments can neither rotate nor shear against each other. There will be no hyperemic decalcification and no absorption of the neck at the line of fracture. The nails should be inserted from points low on the shaft of the femur and should be directed upward at an acute angle so that the head "sits on top" of the nails and the fragments jam tightly together with muscle activity or on weight-bearing. Nails properly anchored will not move forward or backward. They are made of a type of stainless steel which is non-corrosive and non-irritating and they may be left in place indefinitely.

Read before the Postgraduate Surgical Assembly, the ninth annual meeting of The Southeastern Surgical Congress, Louisville, March 7, 8 and 9, 1938.

In a general way this form of treatment is not limited by the age or general condition of the patient, or by the mechanics of the fracture. In very obese patients the operation is more difficult, the mechanical strain on internal fixation is greater, and in some cases I have applied double leg boots with a cross-bar to restrict motion

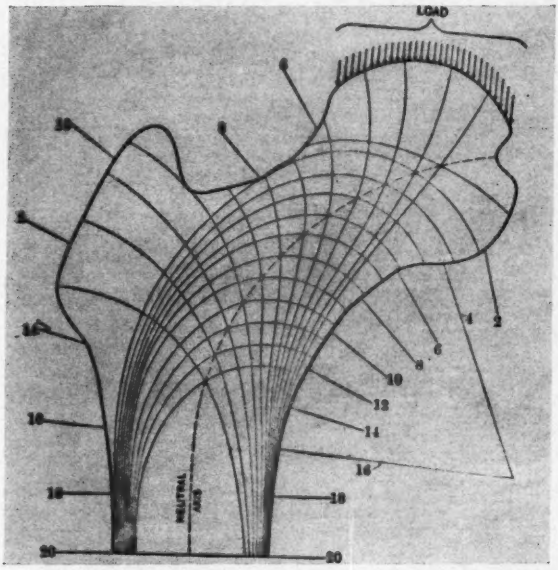
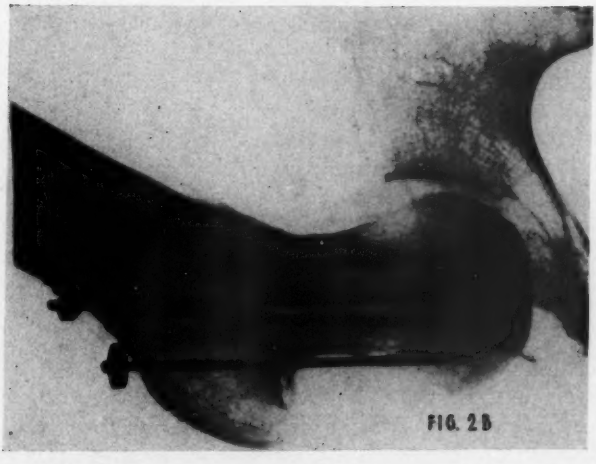


Fig. 1. This figure illustrates the lines of stress (After Koch) that are laid down by lamellae in the normal bone. Fixation of the fracture is influenced by: first, the tension stress; second, the compression stress; third, the horizontal stress; fourth, the rotary stress. The neutral axis in the center of the bone is the location of least stress applied and any appliance for internal fixation placed in the center of the bone is located in the weakest axis for mechanical support. Nails should be widely separated and lying properly in the line of the greatest tension stress in the upper part of the neck, and in the line of the greatest compression stress in the lower portion of the neck. The nail points should engage the head in widely divergent locations. The line of fracture influences the type of fixation. Vertical lines of fracture produce the greatest shearing or horizontal stress. Four nails, two in the upper portion of the neck and two in the lower portion of the neck, lying in parallel planes are mechanically best suited to a fracture of the neck of the femur.

and prevent extreme external rotation of the limb as it lies on the bed. In a few desperately ill, apparently hopeless, cases, I have reduced the hip and held it in a well-leg splint until the patient's condition improved so much that operation could safely be undertaken.

Operation should be performed as soon as the patient has reacted from shock following the accident. The operation itself is not shock-producing and usually the patient is much more comfortable immediately after operation. The shock produced by pain from the dis-

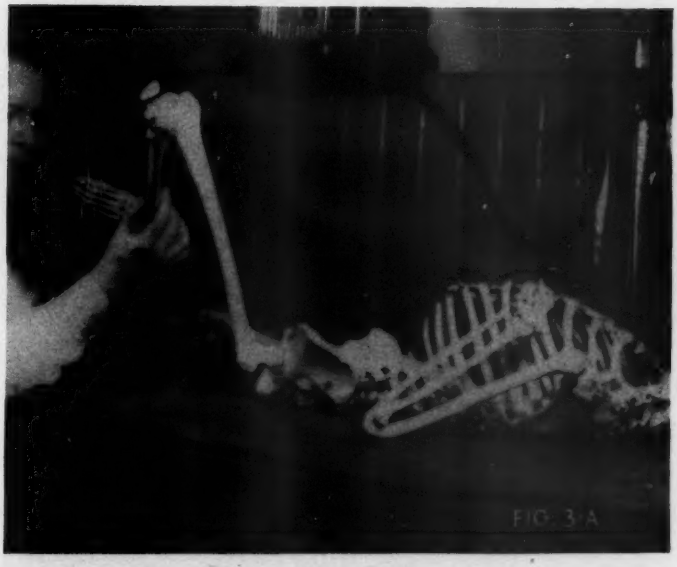


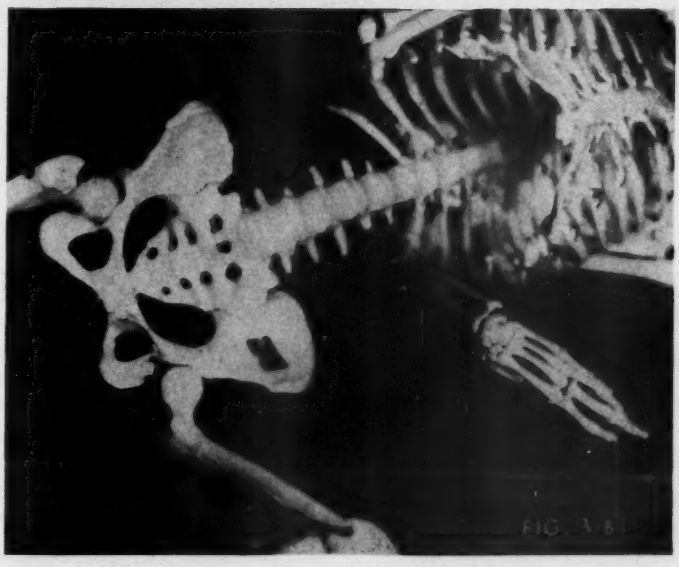
Figs. 2a and 2b illustrate what theoretically appears to be the ideal position of nails for internal fixation for a fracture of the neck of the femur. Four nails are used more or less parallel to each other spaced as wide apart as possible, inserted from points low on the shaft and are directed upward at an acute angle into the head. The two upper nails take the tension stress, the two lower nails carry the compression stress. The four nails prevent rotation and prevent horizontal stress or any shearing force that may be applied.

placed fragments is much worse than operative shock even in the very aged and feeble patients. Following reduction and the perfect immobilization that internal fixation affords, there is no more pain and the patient's general condition is immediately improved. The operation can be done easily under local anesthesia, though it is not exclusively recommended. I have done a number of cases under spinal anesthesia and morphine and hyoscine supplemented by gas. The latter combination seems to work especially well.

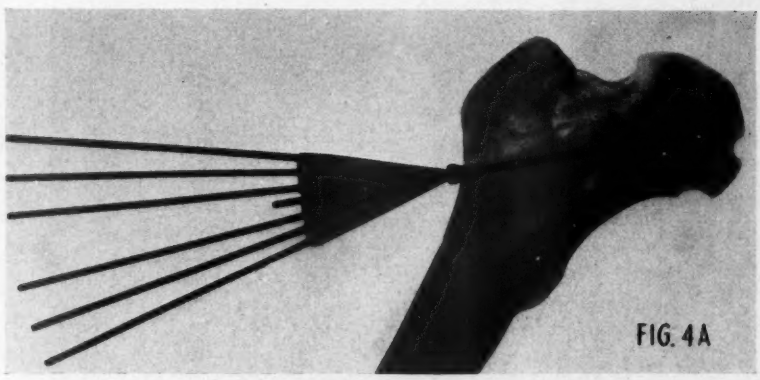
The reduction is done according to a modified Leadbetter technic very gently applied. Frequently all that is necessary is to rotate internally and abduct the extremity. Usually the fragments can be perfectly reduced and I am never satisfied unless the reduction has been perfect. The patient lies on a special tunnel which holds the x-ray film and allows it to be changed from the opposite side of the table. X-rays are made with a mobile unit in the operating room and the films developed in a nearby dark room in concentrated warm solutions so that the pictures may be seen without delay. Cooperation of the x-ray department is essential in the handling of these cases. Anteroposterior and lateral views can be made at any time during operation without disturbing the sterile technic. The lateral view is made by flexing the hip to a right angle, the x-ray tube and film remaining in the same position as used in taking the anteroposterior exposure.

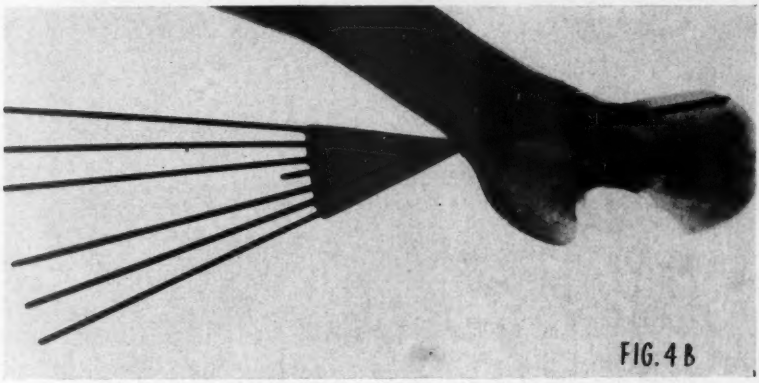
If x-rays show that the reduction is satisfactory an incision is made over the lateral surface of the thigh and the nails are inserted. The length of the neck can be estimated by a measuring rod placed on the side of the thigh before the x-ray exposure is made and the length of the nails required is adjusted accordingly. The nails can be made longer or shorter simply by turning the nuts on their outer ends. Usually a comparison with the x-ray image is sufficient to adjust the length of the nails. Four drill holes are made in the shaft of the femur through which the nails are inserted. The nails are held in a special chuck handle and, because of their diamond shaped drill points, they can easily be rotated upward through the neck and into the head of the femur. They are directed toward the mid point of the inguinal ligament and inserted in a plane parallel to the horizontal plane of the table upon which the patient is lying. As the points move upward into the head, the fairly porous, spongy medullary bone in the neck is felt and as the point reaches the upper dense portion of the head greater resistance is easily detected. Because of the ability to feel and because of the length of the nail can be judged accurately, the check-up x-rays usually show them to be in good position. After each nail is inserted the hip is rotated to be sure that the point has not penetrated too far. The nails should





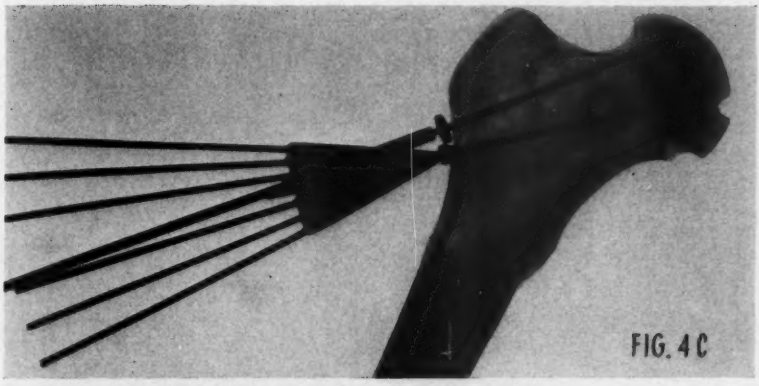
Figs. 3a and 3b illustrate the position of the patient while a lateral x-ray of the hip is being made. The thigh is flexed beyond a right angle approximately 70 degrees, externally rotated approximately 45 degrees, and abducted approximately 30 degrees. This position throws the trochanters out of the view line, makes the neck parallel with the film below and gives a perfectly clear view of the entire head and femoral neck.

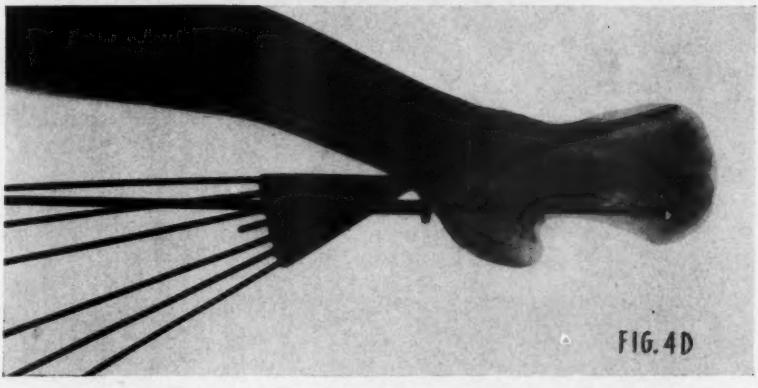




Figs. 4a and 4b illustrate a recently devised inexpensive type of direction finder. Six wires are held together with a small piece of lead cannulated in its center. By slipping this over a nail which has been inserted, the direction for the nail which is to be properly inserted may be obtained.

be inserted in lines closely approximating the lines of normal weight bearing stress. The upper nail enters at a point about one-half inch below the vasternus line and the lower two nails are about one and one-half inches lower on the shaft. The nails go upward at an acute angle into the head along lines which are widely separated from each other and the points engage the head in widely separated positions. If x-rays show satisfactory position, the fragments are lightly impacted, extra drill holes are made up into the head to increase blood supply, and the projecting ends of the nails are cut off. A small piece of stainless steel wire is wrapped from one nail to the other and tied. This prevents the nuts from working off and the nails from moving out backwards. The wound is closed without drainage.

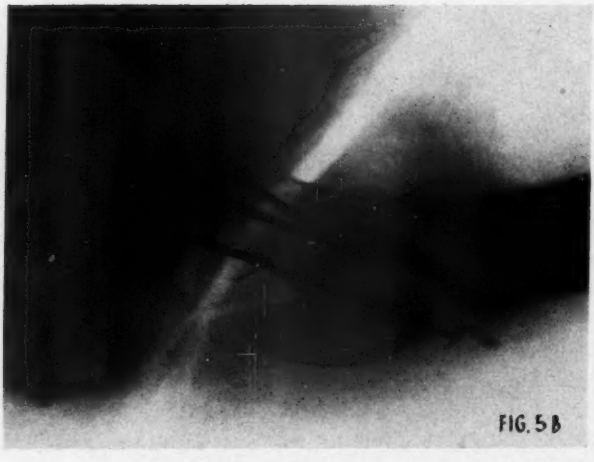




Figs. 4c and 4d. The upper figure shows the second or properly inserted nail in the A. P. view. The lower figure reveals the nail inserted in the lateral view. By using a single rod which slips over the head of a projecting nail, the other three can be easily guided in so that all nails will be inserted in a parallel fashion.

The patient is propped up in bed immediately after operation or just as soon afterwards as is justified. The next day he may be up in a wheel chair and in a few days the use of crutches is permitted. I encourage my patients to move about and to return to normal activity, except weight-bearing, as soon after operation as possible.

X-ray evidence influences the time of weight-bearing, which depends also on the line of fracture and the perfection of apparent immobilization. The weight of the patient is also an influencing factor. The heavier the patient, the longer the time before complete weight-bearing. I try to be conservative and believe it is safer to restrict weight-bearing for a long time. The usual advice is that full weight is not to be borne for six months following operation.



Figs. 5a and 5b. X-rays, A. P. and lateral of the hip taken five years after operation. Patient 85 years of age. Only three nails were used, but the head was reduced in a good valgus position and the nails take on tension, compression, horizontal and rotation stresses. There has been no absorption of the neck and this patient has a perfect functional and anatomic result.

My experience over a period of four and one-half years with this method has been increasingly more gratifying. With improvement in technic good results can be anticipated with more and more certainty. The operation is not difficult and can be performed quickly if all details are perfectly understood. Without this knowledge and without proper working facilities the operation is dangerous and should not be attempted. Within the period of four and one-half years, I have performed a total of 126 operations. Approximately one-half of these cases have been fresh intracapsular fractures of the femoral neck but a few have been late with delayed union. The remaining were intertrochanteric fractures and have healed well, as would be expected. I have not selected my cases and a number of them have been bad risks for surgery. There has not been a death as a result of operation but a number failed to live two years following operation—the time set as a minimum for end-result classification. There has been one case of postoperative soft tissue infection without bony involvement and without serious consequences.

A recent survey revealed that thirty-six cases of fresh intracapsular fractures of the neck of the femur could be classified as having end-results. Of these 36 cases, there were 32, or 88.8 per cent, with solid bony union. There were 3 cases, or 8.3 per cent, with nonunion, and one case, or 3.6 per cent, with fibrous union. These results are from cases done early in the series and it is my belief that there will be improvement in the statistics compiled on later cases. If we are satisfied with nothing short of perfection in every detail in the treatment of fresh fractures of the neck of the femur, I believe that this injury, instead of being the unsolved fracture problem, will be one of the most satisfying conditions orthopedic surgeons are called upon to treat.

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GUNSHOT WOUNDS OF THE ABDOMEN

I. A Consideration of Their General Management, Based on Thirty-five Personal Cases

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New Orleans

ALTHOUGH the fundamental principles which were recognized and practiced in the management of gunshot wounds of the abdomen during the World War remain essentially the same, improved methods and facilities have subsequently been developed for applying these principles. Furthermore, several comparatively recent and important advances in surgical practice have a direct bearing on the management of gunshot wounds of the abdomen. Thirty-five cases of perforating gunshot wound of the abdomen with visceral injury, operated on by me at Charity Hospital, constitute the material for this discussion of the management of such injuries, whether encountered in civil or military practice.

The diurnal incidence of the wounds in this series, represented in fig. 1, was greatest between the hours of 9 p. m. and 3 a. m., a period when hospital activities are at a low ebb and prolonged delays are likely to occur. This not unusual chronologic incidence of peacetime gunshot wounds of the abdomen implies the need for the continuous operation of certain important departments in hospitals which receive patients with such wounds. To insure the proper early care which is so essential, provisions must be made for promptly rendering such essential services as the matching or typing of blood, and roentgen examination. An operating room and an adequate operating room personnel, including a competent anesthetist, should be ready for immediate functioning.

The seasonal incidence of the wounds in the present series, indicated in fig. 2, was greater during the holiday seasons when hospital resident staffs are often depleted through leaves of absence, and during the winter months when transportation facilities are more frequently impaired. As it is often necessary that at least one intern be assigned solely to making the repeated blood pressure, pulse, urine, and other observations, and to administering infusions, transfusions or other therapy which patients with gunshot wounds of the abdomen so often require, the importance of maintaining an adequate resident staff is again apparent. The advantage gained by early operation in most cases of gunshot wound of the abdomen is indicated in figs. 3, 4 and 5. Oberhelman and Le Count,[1] after an

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extensive review of the literature and a study of 343 cases treated at Cook County Hospital in Chicago, concluded that "Perhaps the most important element aiding the recovery of patients with bullet wounds of the abdomen is a short interval between the injury and

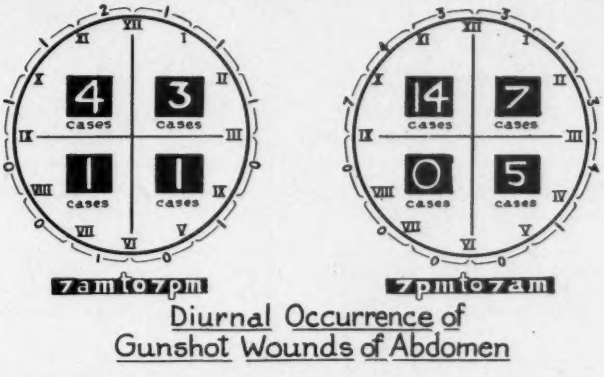

Fig. 1. The diurnal incidence of gunshot wounds of the abdomen in personal series. Note that the incidence of the injuries was highest between the hours of 9 p. m. and 3 a. m.

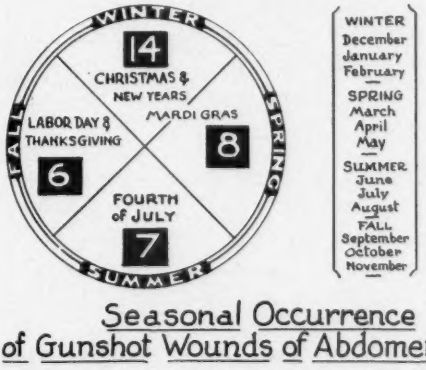

Fig. 2. The incidence of gunshot wounds of abdomen in relation to the seasons and to principal holidays. Note that the greatest number of gunshot wounds occurred during the months or season including Mardi Gras.

the operation." Important as is early operation, the high mortality associated with the performance of surgical procedures in the presence of severe shock sometimes makes postponement of operation either advisable or absolutely imperative. The selection of the optimal time for operative intervention and the necessity of deferring operation when profound or even moderate shock exists, have been referred to by Miller,[2] Loria[3] and others. Because of the irreversible deleterious effects of prolonged shock, the advisability

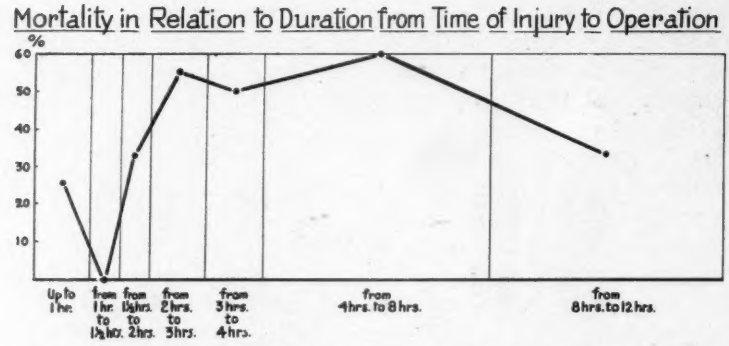

Fig. 3. Relationship between mortality and period elapsed from time of injury to time of operation. The relatively lower mortality at the extremes of the graph reflect the lesser degree of shock and hemorrhage existing in the cases which could either be operated on early or which were necessarily operated on late.

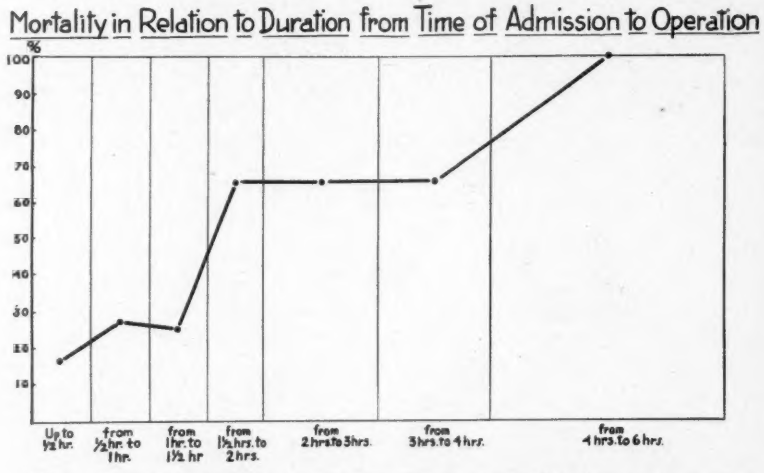

Fig. 4. Graph showing the almost constant direct relationship between the mortality and the period elapsed from time of admission to the time of operation.

of rapid preparation of gunshot wound cases for operation must, as emphasized by Condict,[4] be conceded. Relief of shock and the restoration and continuous maintenance of the blood pressure above shock levels should be accomplished as quickly as possible through the administration of morphine, the application of external heat, the employment of the Trendelenburg position, and the intravenous infusion of saline or acacia solution. When shock is the result of hemorrhage, the early transfusion of an adequate amount of blood is of paramount importance. The improved methods and facilities now available for administering blood make it less often necessary

to postpone operative intervention because of shock due to hemorrhage.

The direct relationship between the degree of hemorrhage and the mortality in this series as shown in fig. 6, and referred to by Mason,[5] Loria[6] and others, indicates that the factor of hemorrhage is of greater significance both as a therapeutic guide and as a prognostic index than is the number of visceral perforations as indicated by fig. 7. Difficulty in obtaining sufficient amounts of blood from volunteer donors is frequently encountered. Especially in the in-

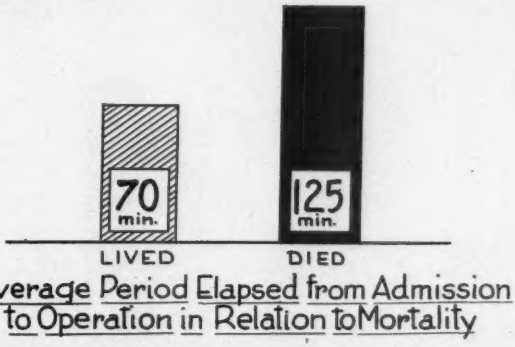

Fig. 5. Graphic chart showing comparatively, the average period of time elapsing between admission and operation in the survival and fatal cases of gunshot wounds of the abdomen.

stance of a negro patient, friends and relatives who are often present in large numbers when the patient is admitted to the hospital, suddenly disappear when they anticipate a request for blood. Mason[7] in discussing the problem of blood transfusion has emphasized the need for transfusion registries, but the machinery necessary to assure prompt administration of sufficient amounts of blood is still lacking in most hospitals. In addition to transfusion registries as a means of assuring a source of blood, establishment of "blood banks," as discussed by Fantus,[8] is distinctly desirable. Blood collected from normal donors or hypertensive patients, may be kept in storage for as long as two months. The feasibility of preserving blood removed from cadavers, has been reported by Shamov[9] and Yudin.[10] Bruskin and Farberova[11] and Stavskaya,[12] Goodall, Anderson, Altimas and MacPhail[13] have developed a method of collecting placental blood and feel that this new source can furnish an inexhaustible supply of blood for transfusion purposes. For the preservation of placental blood they employ the following solution, which was developed at the Moscow Institute of Haematology: sodium chloride 7.0 Gm.; sodium citrate 5.0 Gm.; potassium chloride 0.2 Gm.; magnesium sulphate 0.004 Gm.; bi-distilled

water 1000.0 c.c. Goodall[13] and his co-workers are most enthusiastic about the use of placental blood: because of its higher corpuscular content and its clot-forming property they believe that at least in these respects, it is superior to blood obtained from other sources. Improvements in the apparatus for direct transfusion of unmodified blood, as well as the development by Marriott and Kerwick[14] of an improved intravenous drip transfusion method has further contrib-

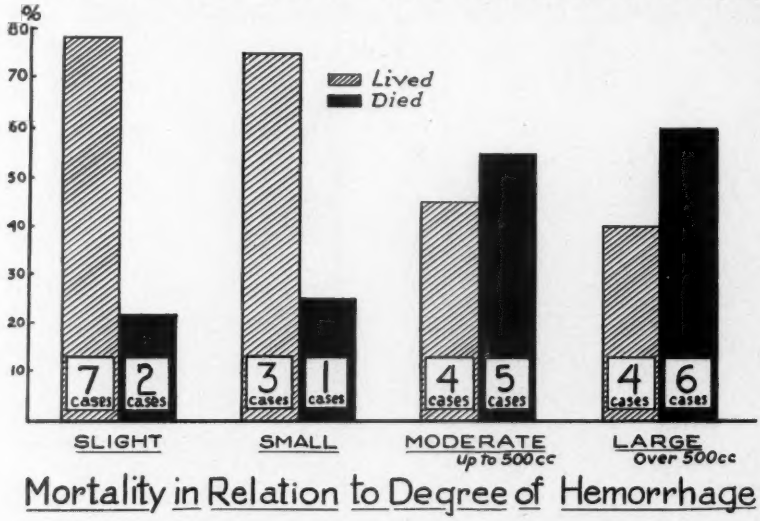

Fig. 6. Comparative graph showing direct relationship between the mortality and the degree of hemorrhage. Comparison of this chart with chart 7 shows the relative importance of hemorrhage as compared with the number of perforations as a prognostic factor.

uted to solving the transfusion problem. Although autotransfusion has been advocated and practiced, especially when hemorrhage into the peritoneal cavity followed injury of the spleen or liver, the possibility of overlooked injuries to hollow viscera and the possible presence of toxic substances in blood extravasated from the liver, make autotransfusion a procedure to be condemned. The advantages of administering untreated whole blood whenever possible, in preference to other methods of transfusion, has been discussed by DeBakey.[15,16] Transfusion of as much as 3000 c.c. or even larger amounts of blood within a period of several hours following a gunshot wound may be advisable. When sufficiently large transfusions are given, there are fewer occasions for the administration of cardiac and respiratory stimulants.

In order to assure that full advantage may be taken of the initial recovery from shock, it is sometimes advisable that patients with

gunshot wounds of the abdomen be sent immediately to the operating room for preoperative observation and preparation, thereby avoiding the undesirable moving of the patient on and off carriers, and in and out of bed. In the instance of patients who do not manifest considerable shock on admission to the hospital, operation should be undertaken as soon as possible in order to avert the possible development of shock due to continued slight hemorrhage or subsequent massive hemorrhage.

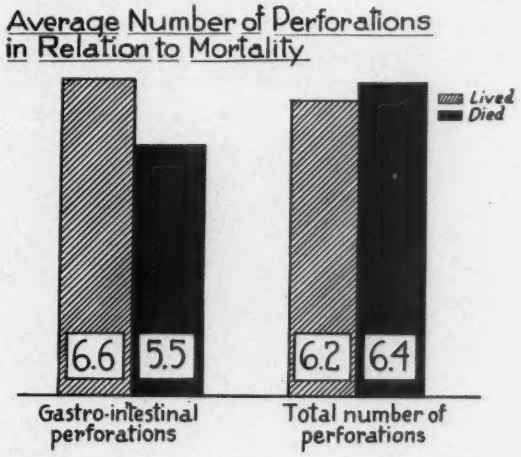

Fig. 7. Showing graphically the comparative number of gastrointestinal as well as the total number of perforations in relation to mortality. The greater number of perforations in the survival group and the relatively slight difference in the average total number of perforations is striking. Comparison of this chart with chart 6 reveals that, as a prognostic index, the degree of hemorrhage is more significant than the number of perforations.

Mortality in Relation to Anaesthetics

	ETHER	ETHYLENE	SPINAL	LOCAL	ETHER & LOCAL	ETHER & SPINAL	ETHYLENE & SPINAL
LIVED	10	2	6	0	1	1	1
DIED	13	0	0	1	0	0	0

Fig. 8. Tabulation showing mortality in relation to type of anesthesia employed in present series of gunshot wounds of the abdomen. Note the absence of fatalities in the group of cases in which spinal anaesthesia was used alone or in combination with other anesthetics.

The choice of the anesthetic for patients with gunshot wounds of the abdomen may be influenced by a number of factors such as the degree of shock, or the presence of associated chest or other injuries. The mortality in relation to various types or methods of anesthesia employed in the present group of cases is indicated in

fig. 8. The survival of all patients whose operation was done under spinal anesthesia, either alone or in conjunction with some other anesthetic, is noteworthy. The use of spinal anesthesia however was limited to the better risk cases, i. e., those not manifesting signs of considerable shock or hemorrhage.

As might be anticipated, there is a direct relationship, as illustrated by fig. 9, between the average duration of operation and the mortality. Prey and Foster[17] are among those who particularly emphasize the importance of avoiding prolonged operations. Time-consuming procedures such as the resection of a segment of intestine are to be avoided whenever possible since, as observed by Oberhelman and Le Count,[1] "In only a few patients do the wounds require resection of viscera or parts of viscera." When intestinal resection

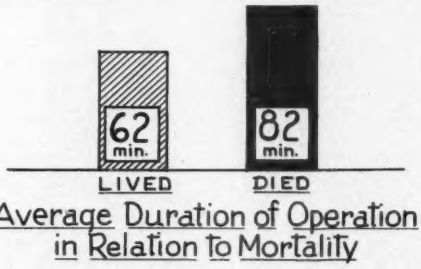

Fig. 9. Chart showing comparatively, the average duration of operation in the survival and fatal cases in present series of gunshot wounds of the abdomen.

is necessary, it should be followed by end-to-end anastomosis. Although the use of anastomosis buttons permits some saving of time, the employment of such devices is especially inadvisable in the treatment of gunshot wounds of the intestine. The practice of lavaging the peritoneal cavity in an attempt to wash away particles of foreign material is now generally considered both futile and inadvisable. The introduction of drains between loops of bowel or into peritoneal recesses for the purpose of influencing the degree and extent of peritonitis, is being abandoned for the same reasons.

Bullets, particles of tissue, feces, pieces of cloth or wadding, blood clots and liquid blood should be picked, sponged, or sucked out of the peritoneal cavity. An accurate count of gauze sponges should be made because sponges used in such cases usually become so soaked with blood that even a large-size sponge may easily be overlooked. Because of the hurried procedure often necessary in gunshot wounds of the abdomen, perforations are likely to be overlooked, and the frequency with which unrepaired perforations are found at autopsy is referred to by Billings and Walking,[18] Wilson[19] and Oberhelman and Le Count.[1] Careful reexamination, especially

of hollow viscera after all perforations are thought to have been repaired, is generally advisable.

Ileus due to peritonitis, exposure and manipulation of the intestines, or the presence of blood in the peritoneal cavity, can be anticipated in almost every case of gunshot wound of the abdomen. The present improved methods of preventing or minimizing the degree of peritonitis and of preventing and treating ileus have been presented in reviews by Ochsner[20] and Storck.[21] These papers embody the observations and principles advanced by Wangensteen,[22] Bartlett,[23] Ochsner, Gage, and Cutting,[24] and others. The installation, immediately after reaction from anesthesia, of an indwelling gastroduodenal catheter attached to some type of continuous suction apparatus, the administration of large doses of morphine, the appli-

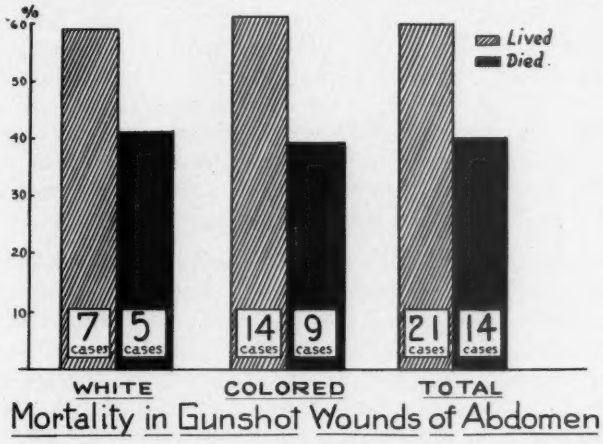

Fig. 10. Comparative chart showing total mortality and mortality according to race in present series of gunshot wounds of abdomen.

cation of heat to the abdomen, the supplying of fluids and nourishment parenterally in amounts advocated by Maddock and Coller,[25] prolonged delay in oral feeding, and avoidance of purgatives, enemas and flushes, are all physiologically sound parts of the prophylactic as well as active treatment of peritonitis and ileus. Following such a regime of treatment, vomiting, hiccup and distention, formerly observed in almost all cases of gunshot wounds of the abdomen, are certainly much less pronounced, and may even be absent. The usual failure of enterostomy to relieve ileus has properly resulted in the general abandonment of this procedure. When intestinal fistulas occur spontaneously or persist following enterostomy, improved methods, as described by Hartzell,[26] are now available which permit more satisfactory management of this complication.

Among the methods which have replaced enterostomy as a means of combating intestinal distention is the administration by inhalation of 95 per cent oxygen as described by Fine, Banks, and Hermanson.[27]

Frequent examination for the possible development of subphrenic, culdesac or other residual abscesses, and the adequate drainage of such abscesses by appropriate means such as that described by Ochsner and Graves[28] for subphrenic abscess, are important parts of the postoperative management of gunshot wounds of the abdomen. The value of introducing drains in contaminated operative wounds in order to prevent the rupture of intramural abscesses into the peritoneal cavity is attested by the investigations of Quanstrom.[29]

Reduction of the incidence of serious wound infection and wound rupture following operations for gunshot wounds of the abdomen can be accomplished by using interrupted fine silk sutures for closing the abdominal wall incision. Although quite at variance with the generally accepted ideas concerning the use of silk sutures in contaminated wounds, recent personal observations as well as the studies of Shambaugh and Dunphy[30] furnish convincing evidence of the advisability of using silk suture material in such wounds. Silk suture material is likewise distinctly superior to catgut for the repair of gastrointestinal perforations.

Prevention or reduction of postoperative pulmonary complications, notably atelectasis, pulmonary embolism, and pneumonia can be accomplished through adequate hydration and early mobilization, the application of heat, the avoidance of tightly applied dressings, and the promotion of postoperative pulmonary hyperventilation through forced deep breathing, or induction of hyperpnea by means of carbon dioxide and oxygen inhalations immediately following operation and during the subsequent postoperative period. The importance and efficacy of such measures has been emphasized by Ochsner and DeBakey,[31] as well as by Snyder,[32] Cutler,[33] Sante[34] and Henderson.[35]

Even though the 40 per cent mortality in this series, as shown in fig. 10, is somewhat less than the average mortality reported for perforating gunshot wounds of the abdomen, availability of several of the most recently developed methods, especially those for preserving blood, would almost certainly have assured the survival of additional patients.

Summary

1. An analysis of certain data concerning thirty-five personally managed cases of perforating gunshot wounds of the abdomen is presented in relation to recent advances in surgical practice.

2. The diurnal and seasonal occurrence of gunshot wounds of the abdomen is of significance in relation to the organization of hospital facilities for the care of such injuries.

3. Shock and hemorrhage are factors of utmost importance in gunshot wounds of the abdomen. Improved methods have been developed to meet the transfusion requirements of patients with such wounds, thereby facilitating the treatment of shock due to hemorrhage, and permitting earlier operation.

4. Improved methods of prophylactic and active treatment of peritonitis and ileus influence favorably the prognosis in gunshot wounds of the abdomen.

5. Spinal anesthesia is safe in selected cases of gunshot wounds of the abdomen.

6. Drains introduced into the peritoneal cavity at the time of primary operation are ineffectual, but drainage of the abdominal wall wound is advisable.

7. Enterostomy is seldom beneficial and has been supplanted by more effective methods of preventing or relieving ileus.

8. Observation for and adequate drainage of residual abscesses is important in the management of gunshot wounds of the abdomen.

9. The severity of wound infection and the frequency of wound rupture may be reduced by employing interrupted fine silk sutures for the closure of the operative incision.

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SUBTROCHANTERIC AND HIGH SHAFT FRACTURES OF THE FEMUR

Closed Reduction Based on a New Anatomic Approach to Treatment

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THE mechanical difficulties attendant to procuring correct alignment in high shaft and subtrochanteric fractures of the femur are without parallel elsewhere in the lower extremity. Marked displacements resulting from antagonistic pull of the powerful thigh and hip muscles which act in this area frequently make closed reduction by the usual methods well nigh impossible. Even extensive open procedures so often resorted to in these cases usually fail to maintain correct replacement and to restore normal bone contour and length. The recognized inadequacy of standard methods and the lack of any practical solution has made for a comparative paucity of discussion in both current journals and fracture textbooks regarding this important and oft deforming injury.

Although less common than fractures through the hip above, or the femoral shaft below, subtrochanteric fractures are by no means unimportant. The adequate blood supply which is assured by the presence of the very muscles causing the displacement will promote union in most cases, yet residual deformity of the extremity from loss of leg length, mis-alignment, and angulation all prove tragic to the patient even though the fracture site is firm. The function of the leg is often further impaired by limitation of motion and muscle weakness about the hip—added results of mal-union.

The distinct need for a satisfactory method of treating subtrochanteric fractures prompted a clinical study of the problem, the solution of which has been achieved by devising a simple, closed system of skeletal traction and countertraction which provides and maintains anatomic reduction, yet allows crutch-ambulation throughout convalescence. The procedure may be carried out in any standard hospital by any surgeon familiar with fracture mechanics. Special assistants or special training in bone and joint surgery, although desirable, are not essential to the successful use of this method.

ANATOMY

In order correctly to maintain the torso on the lower extremities and still assure a high degree of motion with stability, nature has provided a delicately balanced and counterbalanced system of powerful muscles about the upper femur and pelvis. Displacements fol-

lowing fractures in the subtrochanteric area result from disruption of this muscle balance.

The strong iliopsoas muscle coming down over the brim of the pelvis to attach to the lesser trochanter will actively flex and externally rotate the short upper fragment. Further external rotation deformity is caused by the pull of that muscle group attached to the posterior trochanteric area; namely, the obturators, gemelli, pirifor-

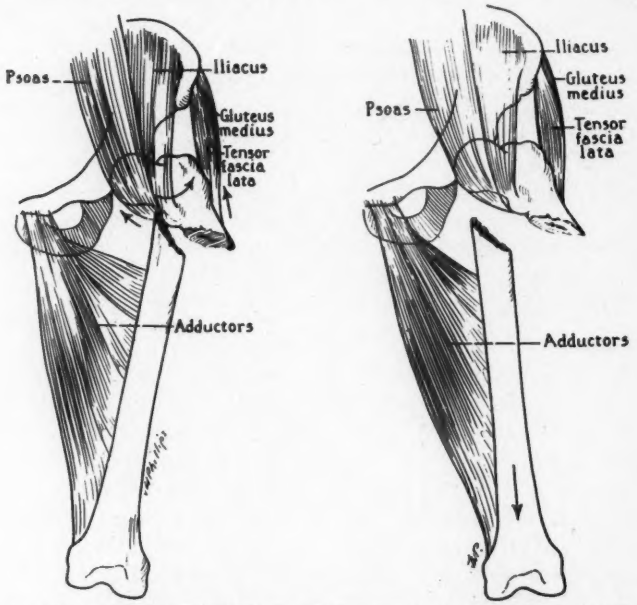

Fig. 1A. Diagrammatic illustration of the typical deformity in high shaft and subtrochanteric fractures of the femur. Note the direction of pull of the principal muscle groups acting at the fracture site. With the single exception of the tensor fascia lata, all muscles responsible for shortening originate medial to the fracture site.

Fig. 1B. Illustrating the inability properly to reduce the fracture by traction. Although the shortening can be overcome, the pull of the adductors, pectineus and other muscles, tensed by traction on the femur, deflect the upper end of the shaft medially without corresponding effect on the trochanteric fragment. Thus traction alone accentuates the displacement.

mis, and quadratus femoris. Abduction displacement is produced chiefly by the gluteus medius and minimus.

The upper end of the long shaft fragment, on the other hand, is strongly adducted and pulled superiorly and medially toward the symphysis pubis by the pectineus muscle and the upper thigh adductors inserting along the posterior and medial aspect of the femoral shaft. The gluteus maximus assists in this medial displacement, and in addition pulls the upper shaft posteriorly. A formidable array

of muscles, including those mentioned above, and others extending from the pelvis down to the knee and beyond, such as the biceps femoris, semimembranosus, and rectus portion of the quadriceps femoris all combine to effect a most stubborn shortening. The characteristic deformity thus produced is illustrated in fig. 1A.

Since the upper fragment cannot be controlled by external manipulation, closed reduction has been an attempt to line up the shaft fragment with the short hip fragment. Unfortunately, this is both

Fig. 2. Mrs. H. A. Radiograph of an atypical subtrochanteric fracture of the femur. The lesser trochanter has remained attached to the shaft. Usually it is completely broken off and lies anterior as a separate fragment, or remains attached to the upper fragment.

awkward and unsatisfactory. As an increasing amount of traction is applied in an attempt to overcome shortening and align the fragments, the traction encounters the resistance of the muscles crossing the fracture site. With the single exception of the comparatively small or fascial latae, the muscles opposed by traction on the thigh originate medial to the fracture. Although it is possible with traction to overcome the shortening, an increasing medial displacement of the upper end of the femoral shaft inevitably follows this maneuver, with separation of the fractured surfaces (fig. 1B). The difficulties encountered in attempting to place the distal fragment in an exaggerated position of abduction, flexion and external rotation

further complicate closed reduction and after several unsuccessful attempts, the operator usually resorts to an open operation (figs. 2 and 3).

The problem is almost as perplexing with the area exposed surgically, for even with direct manipulation of the fragments and alignment accomplished, standard means of internal fixation will usually not suffice to hold the reduction. The variable shape and

Fig. 3. Mrs. E. C., another type of subtrochanteric fracture of the femur with marked lateral angulation. This deformity occurs where the fracturing force is directed along an adducted femur, driving the upper end of the shaft fragment outward where it is held, literally propped out by the short upper fragment. When the angulation is corrected by applying traction along the line of the shaft, the upper end of the shaft fragment may be disengaged and strongly pulled medially.

soft cancellous nature of the upper fragment, together with the strong and constant muscle pull, soon loosen screws, plates, kangaroo sutures, wire, or other usual fixateurs, and reappearance of displacement occurs in spite of what may have been a meticulous and skillful operation. Postoperative splinting in a hip spica offers little further assurance since the buttocks and perineum must be left exposed, thus providing a minimum of external fixation of the superior fragment by this means.

Principles of Treatment

The new method proposed differs from all other technics in providing for the first time direct skeletal control of the *upper* fragment by which means this fragment may be lined up with the shaft and held securely throughout healing. In brief, the treatment consists in (1) *traction* obtained by placing transfixions through the lower femoral shaft just above the knee, using regular through and through Steinmann pins or Kirschner wires; (2) *countertraction* by the angular insertion of two half-pins into the upper femoral fragment with firm fixation of the two pins to an external bar, thus providing a controllable half-pin unit; (3) *reduction* by mechanical manipulation in the author's anatomic splint; (4) *immobilization* by

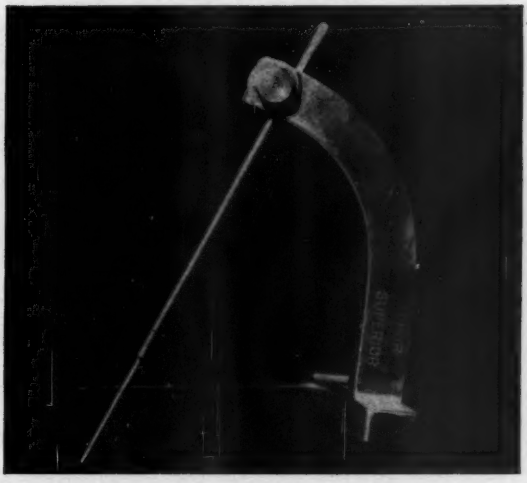

Fig. 4. Subtrochanteric half-pin unit which provides (1) skeletal countertraction, (2) complete manipulative control and (3) absolute fixation of this upper fragment.

incorporating both superior and distal transfixions in a short plaster-of-Paris cast extending from the hip to the knee only, leaving both joints free to move throughout the entire convalescence.

As stated, the essence of this treatment is the mechanical control of the upper fragment accomplished by the use of a special half-pin unit (figs. 4 and 5). Placement of one half-pin from the lateral aspect of the upper fragment and the other half-pin from its anterior aspect allows complete control of this recalcitrant short fragment. With both half-pins firmly held in the external bar, the unit literally furnishes an external "bone forceps" which permits full manipulation and subsequent absolute immobilization of this fragment. The

design of the unit is such that there is no danger of injuring vital structures, since the lateral half-pin is first inserted, fixing the subsequent position of insertion of the anterior pin (fig. 6).

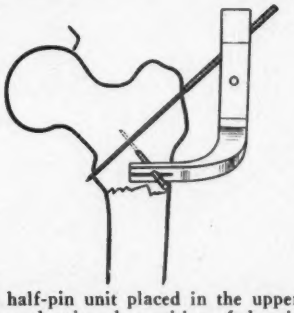

Fig. 5. Subtrochanteric half-pin unit placed in the upper fragment of the left femur, showing the position of the pins.

With both the shaft and short fragment transfixions incorporated in a cast, the patient may move the hip and knee freely and may even be crutch-ambulatory without any interfragmental movement, since the cast acts as a bridge or strut between the fragments. Neither upper nor lower transfixions cross or enter the fracture site. Prolonged hospitalization, immobilization of a large area of the body with fixation of adjacent joints, the dangers of an open operation with the use of foreign bodies at the fracture site, and surgical interruption of the local blood supply are all avoided by this means of treatment. Most important of all is the fact that with this meth-

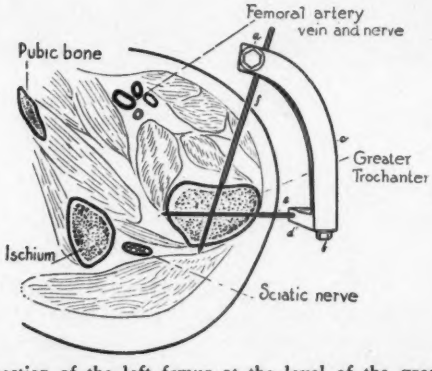

Fig. 6. Cross-section of the left femur at the level of the greater trochanter, viewed from below, showing relative position of the pins in the trochanteric fragment. Observe the safe distance of transfixions from vital structures. As shown, the unit is adjusted to transfix the left femur. By removing a single bolt (b) and placing the anterior curved bar (c) on the opposite side of the straight bar (d) the unit is ready to use on the right side. The cuff shown on each pin prevents overinsertion.

od, reduction can be accurately obtained and firmly held until healing occurs.

Technic

Adequate roentgenograms are taken and a satisfactory examination of the patient is made, including a check on the circulation and nerve supply distal to the fracture site. For ease of insertion of transfixions, the patient is placed on an ordinary operating table so that the injured hip extends well over the side of the table. Anesthetic of choice is given; spinal, intravenous, general, or, if contra-

Fig. 7. Anatomic femur splint set up for reduction of a shaft fracture of the femur. By simply substituting the subtrochanteric unit for the regular upper femoral half-pin unit (a), high shaft and subtrochanteric fractures are reduced and held while a short immobilizing cast is applied incorporating the transfixions.

indications to these exist, a local injection of 2 per cent procaine at the fracture site and the area of pin insertions will suffice.

The whole hip area is surgically prepared with ether followed by quarter-strength tincture of iodine. The hip fragment is then located by probing with a Kirschner wire and the lateral or trochanteric half-pin inserted. This pin is fixed in the bar, but rotates therein freely. The cancellous character of the trochanteric bone allows insertion of the pin by means of a simple hand drill. The pin is inserted directly into the lateral aspect of the greater trochanter in about the center of its upper half. During insertion the straight bar is held approximately parallel to the lateral aspect of the upper fragment—a glance at the roentgenograms will quickly establish the desired position. Half-pins, as the name implies, do not extend through the thigh, but do pass completely through the bone. A shoulder on the pin prevents over-insertion; however, it is essential that the pin extend completely through the opposite cortex of the bone, no harm being done even though it penetrates an inch beyond the opposite cortex.

Before inserting the anterior half-pin, if in doubt, it is advisable to check the depth of insertion of the lateral half-pin by means of fluoroscopy or an x-ray plate, to be certain that it has penetrated the far cortex. With the lateral half-pin inserted to the correct depth, the bar is now held parallel to the thigh so that the curved portion lies over the anterior aspect of the thigh. The anterior or fixation half-pin placed through the hole in the bar can now safely be drilled into place, after which the nut is firmly tightened, locking this pin in the bar. With the trochanteric half-pin properly inserted and the

Fig. 8A. Mr. N. F. Shortening in a difficult and unusual comminuted fracture of the femur.

bar held in line with the thigh, the design of the unit is such that insertion of the anterior pin cannot injure important vessels or nerves (fig. 6). Since both pins are firmly fixed to the external bar, neither can be withdrawn, hence the bone and the bar act as one unit. Dry dressings are placed around the pins, and held in place with non-sterile sheet wadding. This means of skeletal fixation succeeds in that the pins (1) are angularly inserted, (2) transfix *both* cortices of the bone, and (3) are immovably tied together through the external bar.

The knee area is now surgically prepared and two suitable Steinmann pins or Kirschner wires placed through the lower end of the

femur just above the knee. These transfixions should be inserted at a slight angle to each other to prevent lateral slipping on the bone. Sterile dressings are spiked over these transfixions and held in place with non-sterile sheet wadding. When Kirschner wire is used, the wire must be tensed to be effective. For this purpose, I use a light, stainless steel Tautnor so designed that it may be placed on either the anterior or posterior thigh surface. The Tautnor has special extensions for placement in the anatomic splint, and when finally

Fig. 8B. Mr. N. F. The method of treatment illustrates one of the author's earlier technics in reducing these fractures by obtaining control of the upper fragment. Two curved blades were slipped around the bone, similar to an obstetric forceps and the bone manipulated into place. A plaster cast incorporated the projecting blade ends. Upon obtaining union, each blade was then removed singly without an open operation. The subtrochanteric half-pin unit, evolved from this earlier procedure, now offers a simpler and more accurate method for handling these fractures.

incorporated in the plaster its size permits the wearing of ordinary clothing.

The leg and transfixions are now placed in the anatomic femur splint (fig. 7), reduction accomplished mechanically, and checked by x-ray films. This apparatus is a specially constructed fracture tablette which grasps the ends of the transfixions and allows adjustable and controlled motion in any direction, every movement being directed along the normal anatomic lines of the extremity. While

use of the anatomic splint greatly simplifies the reduction, it is not indispensable to this method of treatment, and an ordinary fracture table may be used to obtain traction. It will be necessary, in this case, to grasp the upper half-pin unit manually to accomplish reduction, and to hold the reduction until the cast has been applied and has set. Because it is most difficult manually to secure accurate reduction and to maintain it while x-rays are taken and the cast

Fig. 9A. Pre-reduction roentgenogram of a subtrochanteric fracture of the femur, treated by Dr. Homer D. Junkin of Paris, Illinois.

applied, the mechanical control available with the splint furnishes a much simpler and more accurate method (figs. 8 to 10).

When the fracture has been reduced, a circular, plaster-of-Paris cast, preferably padded, is applied to the thigh, firmly incorporating both upper and lower transfixions. The cast should extend from above the upper transfixion to the knee, but in children or in senile or mentally deranged patients, it may be advisable to extend the cast around the lower abdomen, thus preventing fingering of the transfixion sites.

After-Care

The leg should be watched for swelling during the first few days, and the cast cut spirally along the course of the femoral artery if necessary. This will rarely be indicated, since anatomic reduction

will allay further local trauma with its increased hemorrhage and exudation about the bone ends.

Pin wounds should not be dressed or disturbed, even though there is present some discharge and odor, due to skin irritation caused by movement of the skin about the pins. The wounds heal rapidly after the pins are removed. Occasionally the skin movement will cause some pain around the transfixion sites, and where pain and dis-

Fig. 9B. Roentgenogram of Dr. Junkin's case after reduction with the technic as originally advocated by me. A single lateral half-pin was used here. By using the complete subtrochanteric half-pin unit, immobilization is more secure and crutch ambulation is permitted.

charge become too disturbing to the patient, it is advisable to rest the extremity for a few days until both subside.

Check-up roentgenograms are taken at intervals to observe callus formation and the position of the fragments. If unequal drying of the cast or absorption at the fracture site necessitates subsequent correction, this may be obtained by wedging the cast. If necessary, a thin section may be removed from the entire circumference of the middle portion of the cast, so that manipulation may be accomplished manually or by replacing the leg in the splint.

The patient is instructed to move the knee and hip freely, a definite routine being insisted upon to prevent stiffness and maintain

muscle tone. Although some are able to bear weight painlessly, the use of crutches is advisable.

Cast and transfixions are left in place until sufficient callus is visible to permit their removal. The upper half-pin unit is removed by cutting the plaster wide around the whole unit, then exposing the fixation nut which holds the anterior half-pin in the bar, loosening the nut and withdrawing the pin. The lateral half-pin and bar with

Fig. 10A. Mrs. I. S. Comminuted subtrochanteric fracture of the femur, treated by Dr. J. I. Tuell, Seattle.

surrounding plaster can now be easily lifted out. Following removal of transfixions and cast, the patient should gradually begin weight bearing, under close observation. Frequent roentgenograms are taken as convalescence ensues, and at the first sign of any bowing, a walking caliper splint should be applied.

Although entirely unique, the general principles of this method for treating subtrochanteric fractures follow closely the ambulatory method for treatment of all femoral shaft fractures as used by the author in many cases, and previously reported. Further technical details and case studies may be found in these monographs.[1,2]

Summary and Conclusions

The stubborn and persistent displacement which routinely follows fractures in the high shaft and subtrochanteric area of the femur presents a problem which frequently is mechanically unsurmountable when ordinary closed reduction is resorted to. Even when subjected to a technically difficult open reduction with internal fixation, the

Fig. 10B. The post-reduction position of Dr. Tuell's case. The patient was an extremely obese, elderly woman on whom the subtrochanteric half-pin technic was successfully used. The position of the pins and bar can be seen.

shape and consistence of the upper fragment does not permit firm fixation, and the powerful pull of adjacent muscles predisposes to reappearance of deformity.

A new approach to the treatment of these fractures is presented whereby the usual reduction procedure is reversed and accurate control of the *upper* fragment is obtained, lining up this fragment with the shaft. Complete immobilization is obtained by using a short knee-to-hip cast. When accomplished by the described technic, the operation is a closed procedure, only a few days' hospitalization is necessary, the patient may be fully dressed and is permitted crutch ambulation throughout convalescence with free motion permitted in both the knee and hip. The crippling deformities which com-

monly follow subtrochanteric and high femoral shaft fractures are avoided by this treatment.

The technic is simple, does not require a specially equipped hospital, and is therefore available to any general surgeon familiar with fracture technic.

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TREATMENT OF INGROWING TOENAIL

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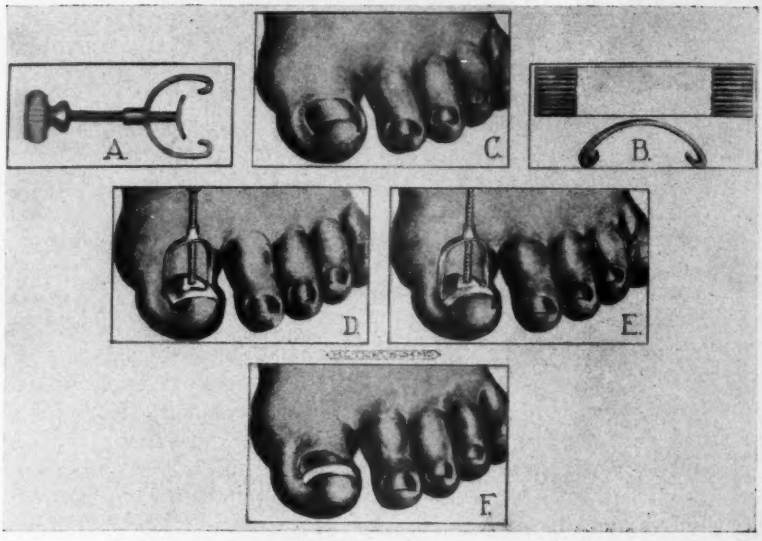
Atlanta

THE nails are epidermal structures which correspond to hoof and claws in lower animals. They are composed of horny material. They are normally slightly curved from side to side and have the lateral margins near the base covered with a fold of skin. Near the distal portion this sulcus is less pronounced allowing the corners normally to lie in a shallow epithelial bed. The nail grows from its proximal end and is trimmed at its distal end at intervals. If in the course of this trimming of the nail the sulcus is injured, or if the corners of the nail are cut so far back that they themselves injure the sulcus it is frequently followed by infection, swelling, and a further injury to the soft tissues. This is frequently the cause of a further attempt to cut away the corners of the nail, which procedure at its best gives only temporary relief. The most important prophylactic factor is to allow the corners of the nail to protrude beyond the soft tissue and thereby reduce the likelihood of injury to the sulcus to a minimum. But even with this care we sometimes will see a nail which will grow in so much that its lateral margins will almost meet. Another factor which contributes to this condition is the wearing of shoes. The foot is kept moist, consequently the nails are softer, and even slight pressure can increase the curvature of the nail.

Numerous types of operations have been devised to alleviate this aggravating condition. The chiropodist cuts the corners further back and gives temporary relief but the condition is made worse each time this procedure is repeated.

The layman will pack cotton under the corners of the nail to raise the edges. This is painful, particularly in the presence of infection. The surgeon will remove segments of the nail together with the nail sulcus and will effect a cure if he is careful to remove the root of the offending portion so that there will be a permanently narrowed nail. But even this may fail or be complicated by nail spurs growing in various directions.

The most important factor in curing an ingrowing nail is to remove the irritating corners of the nail from the nail sulcus and keep it removed. If this is done the infection promptly subsides and the soft tissues return to normal size. This can be best accomplished by restoring the normal curvature or flattening the nail. For this purpose I have devised a toenail splint and an instrument for elevating the edges of the nail to facilitate its application. Figure A shows the elevator which is either slipped over the edges of the nail



from the corners or simply pressed down over the nail until the hooks catch the nail edges. Then the screw is run down until the edges are raised out of the nail sulcus, as shown in fig. D. The splint shown in fig. B is made of semi-hard metal which is ductile enough to be molded with the fingers to the proper curvature. The inner side of each end of the splint is corrugated so that when it is crimped on the nail it will not slip off. The width of the nail is measured and with a suitable instrument the ends of the splint turned hook fashion at the proper length. The curvature is fixed to correspond to the raised nail as in fig. E. The elevator is then removed by depressing one side at the time and the splint pushed further back if necessary. The hooks are crimped over the lateral edges of the nail, leaving the nail edges lifted out of the sulcus.

If the curvature is very pronounced or the nail is very brittle it may be necessary to restore the normal curvature at several sittings. As a rule, the splint must be worn about two months and in some instances a second splint may have to be applied and worn for an even longer period. It is usually necessary to use novocain to apply the splint. It serves its best in the presence of infection, but there are a great many people with potential ingrowing nails whose normal curvature may be restored by wearing the splint a few weeks. I advise the wearing of broad toed shoes at all times but particularly while the splint is in place. If this is done the splint will cause no inconvenience.

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CARCINOMA OF THE STOMACH

THAT carcinoma of the stomach is of more than academic moment is in part accounted for by the fact that 418 individuals in the State of Mississippi, and 27,341 in the United States, were reported in the year of 1937 to have died of that disease. The frequency of this entity and its gravity, as well as the difficulty of establishing an early diagnosis, places gastric cancer in the category of lesions of more than passing concern.

Unfortunately there has persisted for many years, and to a certain degree there still persists in the minds of the laity, to say nothing of the profession, the assumption that malignancy of the stomach is a hopeless condition and that once the diagnosis is established the patient's doom is sealed and that therapy is of no avail. That very attitude accounts in no small part for the fact that the vast majority of patients developing cancer of the stomach within a relatively short space of time do die. Unless and until we can educate physicians as well as patients that recognized early and treated properly a malignant lesion of the stomach offers a reasonably good prognosis, patients will become candidates for surgery late, if at all. Ample data have been accumulated to show that the

From the Department of Surgery, The Vicksburg Hospital and Clinic, Vicksburg.

Read before the Issaquena-Sharkey-Warren Counties Medical Society, Vicksburg, Sept. 12, 1938.

disease while always exceedingly serious is not necessarily a precursor of death.

The statistics of Balfour[1] offer concrete support of this statement. That author reports 4,793 patients suffering with carcinoma of the stomach registered at the Mayo Clinic between the years of 1906 and 1931. In this series, 2,112 (fewer than 50 per cent) had removable growths. Of the patients (submitted to resection) having enlarged lymph nodes, 18 per cent lived five years or longer; of the group not having glandular metastases 48 per cent lived five years or longer. There was an immediate operative mortality of 13.9 per cent. The records of Arthur Allen, Lahey, Walton and others are essentially parallel. Here as elsewhere, as one widens the range of operability, immediate mortality increases. Of greater importance, however, is the fact that an additional, even though small, number of individuals are cured who otherwise would be sacrificed.

There are unfortunately no early symptoms of carcinoma of the stomach. The classical textbook picture of a vomiting male of advanced years, anemic, asthenic, and presenting an epigastric mass, is not the picture of cancer of the stomach, but represents gastric obstruction and widespread metastases with impending dissolution. As Maes observes the very clarity of such a diagnosis settles the patient's doom. To stress the importance of coffee-ground vomiting in establishing the diagnosis of cancer of the stomach is as applicable as to suspect that a building is on fire when the walls are tumbling in. It is of paramount importance that we immediately recognize that only the exceptional case of cancer of the stomach presents any distinct symptoms early in the course of the disease. Patients who fortunately early develop an obstructing growth of such severity that they are warned, if not forced, to seek medical aid are rare, for even such lesions often are practically asymptomatic until the wall of the stomach is thoroughly infiltrated and contiguous and distant structures are involved. It is quite possible, and as a matter of fact most patients do, possess extensive lesions before symptoms of more than minor consequences are noted. Even highly intelligent and cooperative victims may progress far beyond hope of surgical rescue before becoming aware that a dyspepsia exists. In this connection, one might with interest and profit reflect upon the statistics of Alvarez[2] relative to the occurrence and recognition of cancer of the stomach occurring among physicians.

It becomes then immediately apparent that if we are to establish the diagnosis of carcinoma of the stomach at a time when surgical aid is possible, we must examine patients thoroughly upon the slightest provocation. As a matter of fact, there is only one exami-

nation—roentgenologic—that is generally of the slightest aid in establishing even reasonably early the diagnosis of this lesion. If it were possible to subject every individual more than 40 years of age to annual or semi-annual roentgenologic study of the stomach, then of course within a relatively short space of time far more patients having this condition in an operable stage would be found. The operability of the group as a whole would immediately rise as would the percentage of cures. Conversely the immediate surgical mortality would show a corresponding decline. That being impractical, and it is impractical, we can only employ the second best procedure. Certainly persons more than 40 years of age, and particularly males, who give a history of even the slightest dyspepsia, or change in dietetic desires, should not be casually advised to have made roentgenograms of the gastrointestinal tract, but should be urged to have them. There is a great tendency on the part of general practitioners to try all sorts of diets and medications before even considering the possibility that a serious organic lesion may exist. As a result, during the very time that surgical extirpation would offer excellent prospect of success, futile measures are persisted in until the condition becomes so apparent that he who runs may read. Unfortunately at that stage he who runs may read but he may not remedy. In the hands of a competent roentgenologist the diagnosis, in those affected, can be established in a very high percentage of cases. There is likely not more than 4 or 5 per cent error attendant to a properly conducted roentgenologic study of the stomach. One must nonetheless remember that the eye of the x-ray is neither analytical nor infallible.

It is not to be denied that a profound anemia, an anorexia, blood in the stools or vomitus, or any one, or combination of many of these or other symptoms and signs, indicates cancer of the stomach. It is decidedly the exception that any of these symptoms or signs represent an early lesion. Frequent roentgenologic examinations should be employed since this type of study alone is apt to be diagnostic at a time when therapy holds hope. Objection is raised frequently by patients, and not infrequently by physicians, that such an examination is expensive and time-consuming. Neither argument presents a valid objection. The satisfaction of finding that cancer does not exist will placate a reasonable patient for the money expended, and the satisfaction of demonstrating that the lesion present is an early one will prove ample compensation to both patient and physician.

Once the diagnosis is established, the matter of treatment is settled. That there is a very definite mortality attendant upon the operation cannot be denied. That there is a universal mortality if

surgery is not resorted to is equally true. Therefore, unless a patient presents widespread, hopeless metastases, operation should be done: every patient unless such metastases can be demonstrated beyond peradventure of doubt is entitled to a surgical exploration. So long as patients come to surgery late, with the disease far advanced, and with their general condition markedly impaired, the immediate mortality will remain high. Once patients with reasonably early lesions and in reasonably good condition, are operated upon by those experienced in this field, the mortality rate will promptly fall. With the mortality as low as now exists, and with as high a percentage of five-year cures as now exists, with the type of advanced lesions that come to surgery, it is certainly reasonable to assume that, given a fair chance, surgery could permanently salvage many more patients with far fewer immediate deaths.

The preparation of a patient for gastric resection is of considerable importance. The operation is not one of an emergent character and patients should invariably be adequately prepared. This preparation consists in hospitalization, daily lavage of the stomach with hot saline solution if an obstructive lesion is present, the administration of a high caloric, low-residue diet, multiple small blood transfusions if anemia exists, and generally it does, and thorough hydration. The question of anesthesia is worthy of comment. My own preference is for cyclopropane. Finsterer brilliantly employs field plus splanchnic block. The particular anesthetic is chosen on the basis of personal experience and preference. It is highly essential that adequate relaxation of the abdominal wall and of the viscera be obtained. Nothing makes for poorer results than inadequate exposure, imperfect anesthesia, and improper retraction of structures.

At surgery, the type of procedure to be adopted depends naturally upon the condition found. Some patients are frankly inoperable because of extension of the process, fixation of the viscera or for other technical reasons. Even then occasionally a palliative procedure will be found worth while. In our experience as in the experience of most clinics, gastro-enterostomy for this condition ameliorates very little the symptoms, and prolongs life essentially not at all. The procedures of jejunostomy and gastrostomy represent hope abandoned. Palliative resections even in the full knowledge that cure is not possible are often decidedly worth while.

If there is the slightest hope of accomplishing a successful resection, even though the risk of immediate mortality is great, the resection should be attempted, for anything short of such a procedure seals the patient's doom. The particular type of resection to be adopted varies with the extent and location of the cancer and with

the preference of the operator. It has been our experience and it is our belief that the Bilroth-I resection has little to commend it in the management of gastric carcinoma. This procedure represents generally a compromise where the operator for fear of having tension upon the suture line removes so little tissue that the carcinoma is not adequately dealt with. Between the dilemma of fear for the integrity of the suture line, and fear of removal of too little tissue, one is distressed by the knowledge that neither qualification is satisfactorily met. A resection for carcinoma of the stomach should embrace generally the upper end of the duodenum, all of the lesser curvature of the stomach, three-fifths or more of the greater curvature of the stomach, and all of the removable adjacent lymph glands. Personally I prefer the Polya type resection, making the anastomosis retrocolic when possible. Otherwise the anterior or Polya-Balfour operation is generally chosen under which circumstances an entero-anastomosis is added. It is important to ligate the left gastric artery at the point of its origin. Not infrequently metastatic glands will be found in this vicinity. A resection of the stomach for carcinoma differs technically greatly from a resection for a benign ulcer. An incomplete operation is a thoroughly unsatisfactory one. It is performed usually by those whose lack of operative experience results in an immediate operative mortality as high as that which follows a properly performed resection by one of more skill. A two stage operation will occasionally be indicated and may avert mortality. At the first operation the stomach is divided at the level suggested, the distal end closed and the proximal anastomosed to the jejunum. At an appropriate later period (preferably about three weeks) the abdomen is reopened and the distal segment of stomach resected. A growth at the original operation considered irremovable may be found a few weeks later to be easily dealt with. A stage resection here, in contradistinction to operations upon the colon, is not often indicated but is occasionally of great merit.

The postoperative care of these patients is as important as the preoperative preparation. The operation is one of major magnitude and is generally attended by considerable shock. Immediate blood transfusions, drainage of the stomach by an indwelling Jutte tube, adequate hydration, the application of external heat and all of the usual measures indicated following extensive abdominal surgery should be employed. Among the more common postoperative complications, as well as the more serious, are duodenal fistula and infection of the abdominal wall. The former should be guarded against by proper closure of the duodenal stump. Our experience is that it is best accomplished by a running suture of silk which is invaginated by a second row of the same material, finally but-

tressed over by tabs of omentum and buried in or near the head of the pancreas. If duodenal fistula once develops, it is a devastating condition, requiring for its management all of the skill of the most resourceful surgeon.

Infection of the abdominal wall is most surely prevented by scrupulous cleanliness during the performance of the operation, by the frequent changing of protective pads and finally by closure of the abdominal wall with through and through sutures of heavy silk. Even then in a definite number of instances wound infection occurs.

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2. Alvarez, W. C.: How Early Do Physicians Diagnose Cancer of the Stomach in Themselves? Study of Histories of 41 Cases, J. A. M. A. *97:* 77-83 (July 11) 1931.

BOOK REVIEWS

The Editors of THE SOUTHERN SURGEON *will at all times welcome new books in the field of surgery and will acknowledge their receipt in these pages. The Editors do not, however, agree to review all books that have been submitted without solicitation.*

MENINGIOMAS: THEIR CLASSIFICATION, REGIONAL BEHAVIOR, LIFE HISTORY, AND SURGICAL END RESULTS. By HARVEY CUSHING, M. D., Sometime Associate Professor of Surgery, Johns Hopkins University; Moseley Professor of Surgery, Harvard University, and Surgeon-in-Chief, Peter Bent Brigham Hospital, Boston; Sterling Professor of Neurology, Yale University. With the collaboration of LOUISE EISENHARDT, M. D., Assistant Professor of Pathology, Yale University School of Medicine; Formerly Associate in Surgery, Peter Bent Brigham Hospital, Boston. 785 pages, with 685 illustrations. Price, $15. Springfield and Baltimore: Charles C Thomas, Publisher, 1938.

Those who have known for the past few years that this contribution on meningiomas was in the making certainly will have their highest anticipations gratified. Others will unquestionably feel that this one excels all other books by Dr. Cushing on his neurosurgical career.

The experiences of this brilliant surgeon have been depicted in the greatest detail. The successes, failures, mistakes and experiences that one goes through with the senior author's clinical reports savor in some cases of romance in surgery. The story of General Leonard Wood is given in considerable detail. He experienced a head injury in 1898 with the onset of symptoms of brain tumor in 1902; he underwent his first craniotomy in 1905, and his first operation by Dr. Cushing in 1910, his last in 1927. Other case reports of less famous persons are hardly less fascinating.

Among these recordings, errors of omission and commission are to be found, and neurosurgical readers may well profit from both and endeavor to omit "experiences all too slowly acquired." The histologic studies will bring new concepts to many pathologists regarding the variable cellular patterns of meningiomas.

"That certain tumors have a definite predilection for particular regions" has long been recognized by Cushing. The meningiomas therefore have been grouped by Cushing and Eisenhardt according to these common sites. The clinical syndromes correlated with histologic studies, surgical difficulties and survival periods are all covered in each group.

The "recurrence" or in reality continuance of the growth, recorded among the 295 meningiomas is a bit discouraging to the younger neurosurgeon, but with the developments of electrosurgical unit, hope is offered for these groups. Further hope lies in the earlier recognition of intracranial lesions and not in their full blown clinical flowering as so many of the author's earlier cases were.

The opening chapter is given to historical, and histologic comments, the next to a classification of the nine major meningioma types. In the succeeding chapter perhaps some medico-legal controversies will be made more difficult with almost two pages given to the relationship of meningiomas and direct trauma. One chapter is devoted to experiences with 29 spinal meningiomas, another to combined meningiomas and neurinomas. Encouragingly, multiple meningiomas proper are concerned with three experiences. The remaining chapters are given to the individual grouping, with the exception of the final chapter on diagnostic, technical surgical procedures and results.

The bibliography is unquestionably the most complete assembly on meningiomas recorded.

The publisher, in keeping with the brilliant scientific contributions of the authors, have done a brilliant job of publication. Profusely illustrated, typographic errors will have to be sought for, and the photographs, diagrammed sketches and tabulations are painstakingly clear and accurate. The printed matter requires no reading glass.

Truly the art is long but a par has been set by Cushing and Eisenhardt that will long stand as a meningioma course record and even though long the art can only survive with such a contribution as this as an incentive.

EDGAR F. FINCHER, M. D.

MODERN SURGICAL TECHNIC. By MAX THOREK, M. D., K. L. H. (France), K. C. (Italy), Prof. Clinical Surgery, Cook County Graduate School of Medicine; Attending Surgeon, Cook County Hospital; Surgeon-in-Chief, The American Hospital; Consulting Surgeon, Municipal Tuberculosis Sanitarium; Corresponding Member, Societe des Chirugiens de Paris, France; Royal Academy of Medicine, Torino, Italy; Surgical Society, Madrid, Spain; Societe das Sciencias Medicas, Lisbon, Portugal; Fellow International College of Surgeons; Fellow National Academy of Medicine, Colombia, South America; Surgical Academy, Mexico; Honorary Fellow, Bulgarian Surgical Society; Honorary Fellow Egyptian Medical Association, Cairo, Egypt; Fellow, International College of Anesthetists, etc. With a Foreword by DONALD C. BALFOUR, M. B., M. D. (Tor.), LL. D., F. A. C. S., F. R. A. C. S., Head of Section in Division of Surgery, The Mayo Clinic; Director and Professor of Surgery, The Mayo Foundation for Medical Education and Research; Graduate School, University of Minnesota, etc. Complete in Three Volumes. 2045 pages, with 2,174 illustrations, originals principally by W. C. SHEPARD. Price, $33. Philadelphia: J. B. Lippincott Company, 1938.

These three volumes represent a world of work on the part of the author,—and Dr. Thorek has been more than a compiler. He has taken almost every accepted operation in modern surgery, certainly every operation that a general surgeon is ever likely to be called upon to perform, has broken it down into steps, has described each step in turn with extraordinary clarity and precision, and has provided excellent illustrations of important procedures. While he betrays great reverence for the art of surgery, and has a few wholly admirable chapters on the character, the aptitude, the necessary training for a successful surgeon, and it includes a discussion of the standard methods of anesthesia, general, local, regional and spinal, and it includes refresher articles on topographic anatomy with other useful information, the work is a model of condensation. If one must find fault with the work, it is that Dr. Thorek has made surgery appear so simple that inexperienced men may be tempted to undertake operations for which they are not fitted.

Dr. Thorek gives full credit to the historical originators of each operation and lists variations by others as well as himself. He also includes comments from various other famous surgeons pro and con in the various procedures listed.

These volumes are of course somewhat colored by the author's own opinions and based on his wide experience. For example, he gives in detail his method of electrocoagulation of the gallbladder and in keeping with a new trend he

does not advocate routine investigation of the biliary tract in operations on the gallbladder.

Dr. Thorek is even more fanatical in his condemnation of the McBurney incision for appendectomy than is the reviewer and he brings out that Dr. McBurney himself did not advocate his procedure for the general run of cases.

One must again mention the profusion of truly splendid illustrations. In short these fine volumes should prove of real aid to almost every surgeon.

DISEASES OF THE CHEST AND THE PRINCIPLES OF PHYSICAL DIAGNOSIS. By GEORGE W. NORRIS, A.B., M.D., Formerly Professor of Clinical Medicine in the University of Pennsylvania; Chief of Medical Service "A," Pennsylvania Hospital; Erstwhile Colonel, M. C. U. S. Army; and H. R. M. LANDIS, A.M., M.D., Sc.D., Formerly Professor of Clinical Medicine in the University of Pennsylvania. Sixth Edition, Revised. 1019 pages, with 478 illustrations. Price, $10. Philadelphia and London: W. B. Saunders Company, 1938.

With the sixth edition, "Norris and Landis" becomes of age: it still ranks as the classic in physical diagnosis of diseases of the chest. The time-tested text has been repeatedly revised, but because of these very revisions it creaks in spots. Adequate chapters on roentgenology and electrocardiography are presented.

The most distinguishing feature of this book is the extraordinary excellence of the illustrations. There are many photographs of hardened sections which illustrate normal anatomic relationships and also relationships in pathologic conditions. These photographs are of specimens that the authors have found valuable in teaching undergraduates: those who have not had the privilege of studying directly under them are fortunate in having these plates to study. There are of course in addition many more conventional illustrations. The illustrations can neither be improved upon nor can they become obsolete.

DR. BRADLEY REMEMBERS. A novel by FRANCIS BRETT YOUNG. 522 pages. Price, $2.75. New York: Reynal and Hitchcock, 1938.

After fifty years as an undistinguished general practitioner in a small industrial town in England, Dr. Bradley reminisces. The rather appalling account of his first experiences in the operating room and surgical wards seems to ring true, for he entered medical school just as Lister was beginning to revolutionize surgery. It is interesting to read of the struggles of the early proponents of antisepsis.

Dr. Bradley married a girl with social and financial ambitions. His marriage brought him little happiness. After his wife's death he tried to make a doctor out of his son with disastrous results. He invested all of his savings in one company which went broke. There may be a lesson even for the most up-to-date physician in these three misfortunes.

The book is well written and one develops an affectionate regard for the old gentleman.

THE ATLANTA ASSEMBLY, 1939

The Southeastern Surgical Congress returned, as was fitting, to its home city, Atlanta, to hold its tenth annual meeting and Postgraduate Surgical Assembly on March 6, 7 and 8. The program has already been published in these pages and most of the papers presented will be published here within the next year. In many respects this was the most successful meeting the Congress has ever had. The outstanding features were the scientific exhibits and the truly remarkable moving pictures. The program was arranged to secure a more equitable distribution of the various specialties. More papers were presented on recent advances in surgical diagnosis and treatment and a more conservative note as to surgical approach was sounded. Certainly no previous Assembly received such excellent widespread publicity.

Dr. T. C. Davison presided over the meetings and ran them with a punctuality and snap that is all too often lacking in scientific programs. Dr. W. D. Haggard and Dr. T. Z. Cason were unable to be present on account of illness. Dr. R. L. Sanders substituted for Dr. Haggard and Dr. George Gray Ward spoke a second time in place of Dr. Cason. Dr. Frank K. Boland, of Atlanta, delivered the address of welcome. The program otherwise was run as scheduled except that Dr. Fishbein changed the subject of his address from "Fads and Quackery in Healing" to "Social Aspects of Medical Care." Dr. Fishbein still had charlatanry in fields other than healing on the mind and he attacked it vigorously. One would gather from his remarks that Dr. Fishbein is not a New Dealer.

An element of comedy was introduced Monday evening by drawing curtains revealing Dr. Hertzler in an old fashioned buggy. It had required considerable energy to locate a set of buggy harness for his horse. More than 1000 persons attended the Monday evening session. Dr. Hertzler, changing the announced subject of his talk, discussed modern medical education. He was unable to stay over for his second talk.

The Banquet Tuesday evening was featured by an address by President Davison on "Surgical Pioneers in the South." Dr. Mims Gage of New Orleans served as toastmaster and saw to it that the after-dinner speeches were streamlined.

Mrs. George W. Fuller, assisted by Mesdames L. G. Baggett, M. C. Pruitt, T. C. Davison, Dan Sage, R. E. Newberry, J. R. Childs, C. W. Roberts, J. C. Blalock and S. T. Brown, looked after the entertainment of the ladies during the day time. Dr. Hertzler addressed the ladies at their luncheon Tuesday.

The Assembly was characterized by the excellence of the Scientific Exhibits. These exhibits were constantly thronged and in the opin-

ion of at least one, they have never been surpassed except at conventions of the American Medical Association and the A. M. A. exhibits surpassed them only in number. These exhibits should be listed:

THE CONTROL OF PARALYTIC ILEUS BY INTESTINAL INTUBATION. Drs. G. C. Penberthy, C. G. Johnston and R. J. Noer, Wayne University College of Medicine, Detroit.

SURGERY OF THE SYMPATHETIC NERVOUS SYSTEM. By Drs. Alton Ochsner and Michael de Bakey, Tulane University, New Orleans.

BONE TUMORS. By the Willis C. Campbell Clinic of Memphis.

PRIMARY OVARIAN TUMORS. By Dr. Edgar Edgar R. Pund, Department of Pathology, University of Georgia School of Medicine, Augusta.

PATHOLOGIC CHANGES OF THE LYMPH NODES WITH PARTICULAR REFERENCE TO BRUCELLOSIS AND HODGKIN'S DISEASE. By Dr. P. B. Parsons of Duke University, Durham.

ENCEPHALOGRAPHY. By Dr. Cobb Pilcher, Department of Neurosurgery, Vanderbilt University Medical School, Nashville.

ASPIRATION BIOPSY TECHNIC. By Dr. Frank Wrenn and Dr. J. M. Feder, Anderson, S. C.

DIAPHRAGMATIC HERNIA. By Dr. Philemon E. Truesdale, Fall River, Mass.

A DIAGRAM OF LYMPH NODE PATHOLOGY. By Dr. Wiley D. Forbus and Dr. Phillip B. Parsons, Department of Pathology, Duke University School of Medicine, Durham.

DEPENDABILITY OF VITALLIUM IN FRACTURE SURGERY BECAUSE OF NON-ELECTROLYTIC ACTIVITY. By Charles S. Venable, M. D., F. A. C. S.; Walter G. Stuck, M. D., F. A. C. S., San Antonio.

PLASTIC SURGERY. By Dr. William Milton Adams, University of Tennessee, Memphis.

GLYCERIN DRAINAGE. By Dr. E. Dargan Smith, Owensboro, Kentucky.

GASTROSCOPY IN SURGERY. By Dr. Crawford Barnett, Atlanta.

RHINOPLASTIC SURGERY. By Dr. W. G. Hamm, Atlanta.

DEVELOPMENT OF VALVES IN SAPHENOUS VEINS IN THE FETUS. By Dr. C. E. Rushin, Atlanta.

CANCER COMMISSION MEDICAL ASSOCIATION OF GEORGIA. By Dr. J. L. Campbell, Atlanta.

SURGERY OF THE SPLEEN. By Dr. Lon Grove and Dr. Kenneth Bell, Atlanta.

1. ANASTOMOSIS AND ENTEROSTOMY UNDER A CLOSED CIRCUIT. 2. URETERAL TRANSPLANTATION. A New Method. 3. REPAIR OF HARELIP AND CLEFT PALATE BY THE USE OF FASCIA AND RIBBON CATGUT. 4. THYROIDECTOMIES FOR ADENOMA AND THYRO-TOXEMIA. By Dr. Addison G. Brenizer, Charlotte, N. C.

PATHOLOGY OF THE THYROID GLAND. By Dr. A. J. Ayers and Dr. W. F. Lake, Atlanta.

PLASTIC SURGERY. By Dr. Neal Owens, Tulane University, New Orleans.

COLORED DRAWINGS OF NORMAL BLOOD AND BLOOD DISEASES. By Dr. Roy Kracke and Hortense Garver, Department of Pathology, Emory University Medical School, Atlanta.

TUMORS OF THE GENITO-URINARY TRACT. By Dr. Earl Floyd and Dr. James L. Pittman, Atlanta.

TRACHEOBRONCHIAL AND ESOPHAGEAL STUDIES—Lantern Slides. By Drs. Murdock Equen and Frank Neuffer, Atlanta.

EXHIBIT OF THE GEORGIA RADIOLOGIC SOCIETY: Translite of Roentgenologic Pathology.

THE PROGRAM OF THE CRIPPLED CHILDREN'S DIVISION, STATE WELFARE DEPARTMENT. By Martin Myers, M. D., Atlanta. Outline maps of division personnel and activities as to location in state and counties.

AUTOMOBILE INJURIES. Incidence of deaths and injuries due to automobile accidents in the Southeast in 1938. Deaths and accidents in Georgia reported in detail by Major Phil Brewster, Georgia State Highway Patrol. Treatment of shock and various injuries incurred in automobile accidents by the following doctors: Captain Douglas B. Kendrick, M. C., U. S. A.—Mayo Clinic; Dr. Hugh Cochran, Dr. Edgar F. Fincher, Dr. J. D. Martin, Dr. Ira Ferguson, Dr. Henry Poer, Dr. T. C. Davison, Dr. Fred Rudder, Dr. T. P. Goodwyn, Dr. Walker Jernigan, Dr. Calvin Sandison, Dr. Lawson Thornton, Dr. Martin Myers, Dr. J. H. Boland, Dr. W. Paul Elkin, Dr. William Hamm, Dr. Earl Floyd, Dr. James L. Pittman, of Atlanta.

THYROID CONDITIONS IN GEORGIA. Junior League Thyroid Committee, Grady Hospital; pictorial presentation of interesting diseases and conditions seen in a non-endemic area.

LOW BACK PAIN WITH SCIATICA. By Dr. Lawson Thornton and Dr. Calvin Sandison, Atlanta.

Included with the scientific exhibits was an extraordinary collection of moving pictures. In addition to the moving pictures that were shown before the whole Assembly, moving pictures were kept constantly going in two rooms on the mezzanine floor. Each picture was shown twice at a scheduled hour and the last day one room was devoted to a "request program" of pictures that had already been exhibited. Too much credit cannot be given to Dr. Fred F. Rudder for his great energy in assembling the scientific exhibits and the extraordinarily fine moving pictures, and for the precision with which they were run:

THORACIC INJURIES. By Dr. D. C. Elkin and Dr. J. D. Martin, Atlanta.

OPERATION FOR CARCINOMA OF THE BREAST. Dr. Hugh H. Trout, Roanoke.

VAGINAL HYSTERECTOMY. Dr. N. Sproat Heaney, Chicago.

RADICAL MASTOIDECTOMY AND SKIN GRAFT (color). Drs. A. G. Fort and Lester A. Brown, Atlanta.

NORMAL AND PATHOLOGIC LARYNX (color). Drs. Russell Burke and Wm. Armstrong, Atlanta.

TECHNIC OF FULL THICKNESS GRAFT FROM ABDOMEN TO FACE. Dr. Earl C. Padgett, Kansas City.

TREATMENT OF CANCER OF THE LIP. Dr. Calvin B. Stewart, Steiner Clinic, Atlanta.

ATTEMPT TO SALVAGE A CASE OF CARCINOMA OF SCALP WITH LOSS OF BONE FROM FRONTAL SINUSES TO EXTERNAL OCCIPITAL PROTUBERANCE (color). Drs. T. C. Davison and Fred F. Rudder, Atlanta.

LARYNGECTOMY FOR CANCER OF THE LARYNX. Dr. Edward A. Looper, Baltimore.

RADICAL MASTECTOMY. New York Post Graduate Medical School.

SCALENIOTOMY FOR CERVICAL RIB. Dr. Alton Ochsner, New Orleans.

LUMBAR SYMPATHETIC GANGLIONECTOMY. Dr. Alton Ochsner, New Orleans.

TECHNIC AND DEMONSTRABLE ADVANTAGES OF THE DEVINE COLOSTOMY. Jackson Clinic, Madison, Wisconsin.

A SIMPLE, EFFICIENT METHOD TO DIMINISH THE INCIDENCE OF PRIMARY AND SECONDARY INFECTION IN SURGICAL WOUNDS. Jackson Clinic, Madison, Wisconsin.

CHOLECYSTECTOMY AND CHOLEDOCHOSTOMY. Lahey Clinic, Boston.

COMPLETE COLECTOMY, ULCERATIVE COLITIS. Lahey Clinic, Boston.

POSTERIOR OR PERINEAL RESECTION FOR CARCINOMA LOW IN THE RECTUM. Lahey Clinic, Boston.

LATZKO EXTRAPERITONEAL CAESAREAN SECTION. Dr. Henry T. Burns, New York City.

BECK OPERATION CORONARY DISEASE USING PECTORAL MUSCLE. Dr. Harold Brunn, San Francisco.

O'SHAUNESSEY OPERATION FOR CORONARY DISEASE USING OMENTUM. Dr. Harold Brunn, San Francisco.

ADHESIVE PERICARDITIS. Dr. Harold Brunn, San Francisco.

LAPAROTRACHELOTOMY TRANSVERSE LOW SEGMENT CAESAREAN SECTION (color). Dr. John C. Irwin, Los Angeles.

HUMAN STERILITY. Dr. Paul Titus, Pittsburgh.

PHYSIOLOGY OF FERTILIZATION OF THE HUMAN FEMALE. Dr. Cyrus W. Anderson, Denver.

ABDOMINOPERINEAL RESECTION ONE STAGE OPERATION. Dr. Miles, Lahey Clinic, Boston.

COMBINED ABDOMINOPERINEAL RESECTION FOR CARCINOMA OF RECTUM. Dr. Thomas E. Jones, Crile Clinic, Cleveland.

ONE STAGE COMBINED ABDOMINOPERINEAL RESECTION OF THE RECTUM (sound). Dr. Fred W. Rankin, Lexington.

THOROCOPLASTY, FIRST AND SECOND STAGE, FOR PULMONARY TUBERCULOSIS. Dr. Richard Overholt, Lahey Clinic, Boston.

PNEUMONECTOMY FOR PRIMARY CARCINOMA OF MAIN STEM BRONCHUS. Dr. Richard Overholt, Lahey Clinic, Boston.

SINGLE STAGE LOBECTOMY FOR BRONCHIECTASIS. Dr. Richard Overholt, Lahey Clinic, Boston.

THYROIDECTOMY IN TOXIC GOITER. Dr. Harold L. Foss, Danville, Penn.

LOW CERVICAL CAESAREAN SECTION. Dr. Eldon W. Tice, Los Angeles.

Treatment of Empyema (sound). Dr. H. K. Tenney, Jr., Madison, Wisconsin.

Subtotal Gastrectomy for Intractable Gastric Ulcer. Lahey Clinic, Boston.

Subtotal Gastrectomy for Carcinoma with Use of Sewing Clamp. Dr. William Linder, Brooklyn.

Subtotal Thyroidectomy for Primary Hyperthyroidism. Lahey Clinic, Boston

Anastomosis and Enterostomy Under a Closed Circuit. Dr. Addison Brenizer, Charlotte, N. C.

Ureteral Transplantation, a New Method. Dr. Addison Brenizer, Charlotte, N. C.

Thrombi and Emboli. Dr. C. C. Howard, Glasgow, Ky.

Surgical Treatment of Hypertrophic Pyloric Stenosis. The Fredet Rammstadt Operation. Dr. Guy S. Van Alstyne, Chicago.

Plastic Surgery. Dr. Wm. Milton Adams, Memphis.

Treatment of Varicose Veins. Dr. Howard R. Mahorner, New Orleans.

Plastic Repair of Mouth, Chin and Neck Due to Burn Contracture (sound). Dr. C. R. Straassma, New York City.

Anterior Mediastinal Dermoid Extending Into Right Thoracic Cavity. Dr. S. W. Harrington, Mayo Clinic.

Esophageal Hiatus Diaphragmatic Hernia (Herniation of Stomach and Omentum into Mediastinum). Dr. S. W. Harrington, Mayo Clinic.

Benign Tumors of the Larynx. Dr. Gordon B. New, Mayo Clinic.

Radium Treatment of Carcinoma of Cervix. Dr. Max Cutler, Chicago.

The Congress is grateful to the commercial houses who provided most interesting technical exhibits. They were indeed so interesting that it was sometimes hard to get doctors back into the Assembly hall in time for the papers. The cooperating firms were:

Duke Laboratories, Long Island City, New York.
E. R. Squibb & Sons, 745 Fifth Ave., New York City.
J. A. Majors Company, 1301 Tulane Ave., New Orleans.
Johnson & Johnson, New Brunswick, N. J.
Doak Company, Inc., 2132 E. 9th St., Cleveland.
Estes Surgical Supply Company, Atlanta.
S. & H. X-Ray Company, Atlanta.
Spicer & Company, Glendale, Cal.
Holland-Rantos Company, Inc., 37 E. 18th Street, New York City.
Zimmer Manufacturing Company, Warsaw, Ind.
Lederle Laboratories, Inc., 30 Rockefeller Plaza, New York City.
C. B. Fleet Company, 921 Commerce St., Lynchburg, Va.
Winthrop Chemical Company, Inc., 170 Varick St., New York City.
J. P. Lippincott Company, East Washington Square, Philadelphia.
American Hospital Supply, 1086 Merchandise Mart, Chicago.
Mead Johnson Company, Evansville, Ind.
C. V. Mosby Company, 3525 Pine Blvd., St. Louis.
Surgical Selling Company, Atlanta.

DAVIS & GECK, INC., 217 Duffield Street, Brooklyn, N. Y.
DEPUY MANUFACTURING CO., Warsaw, Ind.
VAN PELT, BROWN COMPANY, Richmond.
GENERAL ELECTRIC X-RAY COMPANY, Atlanta.
WESTINGHOUSE X-RAY COMPANY, INC., Atlanta.
HORLICK'S MALTED MILK CORPORATION, Racine, Wis.
BARD-PARKER COMPANY, INC., Danbury, Conn.
AMERICAN CYSTOSCOPE MAKERS, INC., 1241 Lafayette Ave. (Bronx), N. Y.
THE COCA-COLA COMPANY, Atlanta.

At the business session of the Fellows of the Congress a healthy state of growth was reported from each state. The deaths of the following Fellows since the last Assembly were reported:

DR. VICTOR D. HOLLOWAY
of Knoxville

DR. WILLIAM THOMAS BLACK
of Memphis

DR. JOSHUA FANNING ABEL
of Waynesville, N. C.

The Fellows stood for a few moments in silence in respect.

The reports from Florida, Georgia and South Carolina stressed their sectional meetings whach have already been noted in these pages. Alabama reported a sectional meeting in Tuscaloosa on Dec. 8, 1938, at which President T. C. Davison, President-Elect R. L. Sanders and Secretary-Treasurer B. T. Beasley had delivered clinical talks. The Chairman for North Carolina reported that extension work carried on by the University of North Carolina and Duke University and the separate district meetings made it seem unwise to attempt other meetings in that State. Plans are being perfected in Tennessee for a sectional meeting later on this year.

West Virginia having applied some months ago for admission to the Congress, on recommendation of the Executive Council the Fellows voted to embrace West Virginia.

Dr. R. L. Sanders, elected President-Elect in Louisville last year, automatically became President. Dr. Irvin Abell of Louisville was made President-Elect. Dr. Grady E. Clay of Atlanta was made Vice President and Dr. B. T. Beasley was reinstated as Secretary-Treasurer.

A number of invitations were extended for the 1940 Assembly, particularly from Richmond, Miami, Gulfport, Jackson and Birmingham. The Assembly was finally awarded to Birmingham.

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